

# Padasalai's 12<sup>th</sup> Chemistry Book Back One Marks

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## CHEMISTRY BOOKBACK ONE MARKS (MCQs)

( BASED ON 2020 EDITION )

NAME: \_\_\_\_\_.

CLASS:XII-\_\_.

### UNIT-1 METALLURGY

1.Bauxite has the composition .....

- (a) Al<sub>2</sub>O<sub>3</sub>
- (b) Al<sub>2</sub>O<sub>3</sub>.nH<sub>2</sub>O
- (c) Fe<sub>2</sub>O<sub>3</sub>.2H<sub>2</sub>O
- (d) all of these

2.Roasting of sulphide ore gives the gas (A). (A) is a colourless gas. Aqueous solution

of (A) is acidic. The gas (A) is .....

- (a) CO<sub>2</sub>
- (b) SO<sub>3</sub>
- (c) SO<sub>2</sub>
- (d) H<sub>2</sub>S

3.Which one of the following reaction represents calcination?

- (a)  $2Zn + O_2 \rightarrow 2ZnO$
- (b)  $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$
- (c)  $MgCO_3 \rightarrow MgO + CO_2$
- (d) both (a) and (c)

4.The metal oxide which cannot be reduced to metal by carbon is .....

- (a) PbO
- (b) Al<sub>2</sub>O<sub>3</sub>
- (c) ZnO
- (e) FeO

5.Which of the metal is extracted by Hall-Herold process?

- (a) Al
- (b) Ni
- (c) Cu
- (d) ZO

6. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

- (a)  $\Delta G_r^\circ$  of sulphide is greater than those for  $\text{CS}_2$  and  $\text{H}_2\text{S}$ .
- (b)  $\Delta G_r^\circ$  is negative for roasting of sulphide ore to oxide.
- (c) Roasting of the sulphide to its oxide is thermodynamically feasible.
- (d) Carbon and hydrogen are suitable reducing agents for metal sulphides.

7. Match items in column -I with the items of column – II and assign the correct code:

Column-I	Column-II	A	B	C	D
A Cyanide process	(i) Ultrapure Ge	(a) (i)	(ii)	(iii)	(iv)
B Froth floatation process	(ii) Dressing of $\text{ZnS}$	(b) (iii)	(iv)	(v)	(i)
C Electrolytic reduction	(iii) Extraction of Al	(c) (iv)	(ii)	(iii)	(i)
D Zone refining	(iv) Extraction of Au	(d) (ii)	(iii)	(i)	(v)

8. Wolframite ore is separated from tinstone by the process of .....

- (a) Smelting
- (b) Calcination
- (c) Roasting
- (d) Electromagnetic separation

9. Which one of the following is not feasible?

- (a)  $\text{Zn(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Cu(s)} + \text{Zn}^{2+}(\text{aq})$
- (b)  $\text{Cu(s)} + \text{Zn}^{2+}(\text{aq}) \rightarrow \text{Zn(s)} + \text{Cu}^{2+}(\text{aq})$
- (c)  $\text{Cu(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Ag(s)} + \text{Cu}^{2+}(\text{aq})$
- (d)  $\text{Fe(s)} + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Cu(s)} + \text{Fe}^{2+}(\text{aq})$

10. Electrochemical process is used to extract .....

- (a) Iron
- (b) Lead
- (c) sodium
- (d) Silver

11. Flux is a substance which is used to convert .....

- (a) Mineral into silicate
- (b) impurities to soluble impurities
- (c) impurities to infusible impurities
- (d) All of these

12. Which one of the following ores is best concentrated by froth – floatation method?

- (a) Magnetite
- (b) Hematite
- (c) Galena
- (d) Cassiterite

13. In the extraction of aluminium from alumina by electrolysis, cryolite is added to .....

- (a) lower the melting point of alumina
- (b) remove impurities from alumina
- (c) Decrease the electrical conductivity
- (d) increase the rate of reduction

14. Zinc is obtained from  $\text{ZnO}$  by .....

- (a) carbon reduction
- (b) reduction using silver

- (c) Electrochemical process  
(d) Acid leaching
15. Extraction of gold and silver involves leaching with cyanide ion. Silver is later recovered by .....
- (a) Distillation  
(b) refining  
(c) Displacement with zinc  
(d) liquation
16. Considering Ellingham diagram, which of the following metals can be used to reduce alumina?
- a. Fe  
b. Cu  
c. Mg  
d. Zn
17. The following set of reactions are used in refining Zirconium this method is known as
- (a) Liquation  
(b) Van Arkel process  
(c) Zone refining  
(e) Mond's process
18. Which of the following is used for concentrating ore in metallurgy?
- (a) Leaching  
(b) roasting  
(c) froth floatation  
(d) both (a) and (c)
19. The incorrect statement among the following is .....
- (a) Nickel is refined by Mond's process  
(b) Titanium is refined by Van Arkel's process  
(c) Zinc blende is concentrated by froth floatation  
(d) In the metallurgy of gold, the metal is leached with dilute sodium chloride solution
20. In the electrolytic refining of copper, which one of the following is used as anode?
- (a) pure copper  
(b) impure copper  
(c) carbon rod  
(d) platinum electrode
21. Which of the following plot gives Ellingham diagram?
- a.  $\Delta S$  Vs  $T$   
b.  $\Delta G^\circ$  Vs  $T$   
c.  $\Delta G^\circ$  Vs  
d.  $\Delta G^\circ$  Vs  $T$
22. In the Ellingham diagram, for the formation of carbon monoxide
- (a)  $(\Delta S^\circ \Delta T)$  is negative  
(b)  $(\Delta G^\circ \Delta T)$  is positive  
(c)  $(\Delta G^\circ \Delta T)$  is negative  
(d)  $(\Delta T \Delta G^\circ)$  is positive, after  $700^\circ\text{C}$ ,  $(\Delta G^\circ \Delta T)$  is negative
23. Which of the following reduction is not thermodynamically feasible?
- (a)  $\text{Cr}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Cr}$   
(b)  $\text{Al}_2\text{O}_3 \rightarrow \text{Cr}_2\text{O}_3 + 2\text{Al}$



(d) None of these

24. Which of the following is not true with respect to Ellingham diagram?

(a) The energy changes follow a straight line. Deviation occurs when there is a phase change.

(b) The graph for the formation of  $\text{CO}_2$  is a straight line almost parallel to free energy axis.

(c) Negative slope of  $\text{CO}$  shows that it becomes more stable with increase in temperature.

(d) Positive slope of metal oxides shows that their stabilities decrease with increase in temperature.

### UNIT-2 : P-BLOCK ELEMENTS-I

1. An aqueous solution of borax is .....

(a) neutral

(b) acidic

(c) basic

(d) amphoteric

2. Boric acid is an acid because its molecule .....

(a) contains replaceable  $\text{H}^+$  ion

(b) gives up a proton

(c) combines with proton to form water molecule

(d) accepts  $\text{OH}^-$  from water, releasing proton.

3. Which among the following is not a borane?

(a)  $\text{B}_2\text{H}_6$

(b)  $\text{B}_3\text{H}_6$

(c)  $\text{B}_4\text{H}_{10}$

(d) none of these

4. Which of the following metals has the largest abundance in the earth's crust?

(a) Aluminium

(b) calcium

(c) Magnesium

(d) Sodium

5. In diborane, the number of electrons that accounts for banana bonds is .....

(a) six

(b) two

(c) four

(d) three

6. The element that does not show catenation among the following p-block elements is .....

(a) Carbon

(b) silicon

(c) Lead

(d) germanium

7. Carbon atoms in fullerene with formula  $\text{C}_{60}$  have .....

(a)  $\text{sp}^3$  hybridised

(b)  $\text{sp}$  hybridised

(c)  $\text{sp}^2$  hybridised

(d) partially  $\text{sp}^2$  and partially  $\text{sp}^3$  hybridised

8. Oxidation state of carbon in its hydrides .....

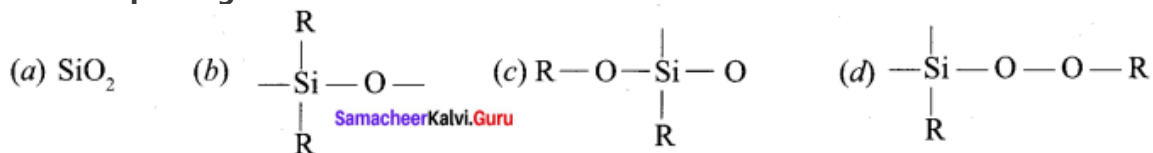
(a) +4

- (b) -4
- (c) +3
- (d) +2

9. The basic structural unit of silicates is .....

- (a)  $(\text{SiO}_3)^{2-}$
- (b)  $(\text{SiO}_4)^{2-}$
- (c)  $(\text{SiO})^-$
- (d)  $(\text{SiO}_4)^{4-}$

10. The repeating unit in silicone is .....



11. Which of these is not a monomer for a high molecular mass silicone polymer?

- (a)  $\text{Me}_3\text{SiCl}$
- (b)  $\text{PhSiCl}_3$
- (c)  $\text{MeSiCl}_3$
- (d)  $\text{Me}_3\text{SiCl}_3$

12. Which of the following is not  $sp^2$  hybridised?

- (a) Graphite
- (b) graphene
- (c) Fullerene
- (d) dry ice

13. The geometry at which carbon atom in diamond are bonded to each other is .....

- (a) Tetrahedral
- (b) hexagonal
- (c) Octahedral
- (d) none of these

14. Which of the following statements is not correct?

- (a) Beryl is a cyclic silicate
- (b)  $\text{Mg}_2\text{SiO}_4$  is an orthosilicate
- (c)  $\text{SiO}_4^{4-}$  is the basic structural unit of silicates
- (d) Feldspar is not aluminosilicate

15. Match items in column – I with the items of column – II and assign the correct code

Column-I	Column-II
A Borazole	1. $\text{B}(\text{OH})_3$
B Boric acid	2. $\text{B}_3\text{N}_3\text{H}_6$
C Quartz	3. $\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4] \cdot 8\text{H}_2\text{O}$
D Borax	4. $\text{SiO}_2$

	A	B	C	D
(a)	2	1	4	3
(b)	1	2	4	3
(c)	1	2	4	3
(d)	None of these			

16. Duralumin is an alloy of .....

- (a) Cu, Mn
- (b) Cu, Al, Mg
- (c) Al, Mn
- (d) Al, Cu, Mn, Mg

17. The compound that is used in nuclear reactors as protective shields and control rods is .....
- Metal borides
  - metal oxides
  - Metal carbonates
  - metal carbide
18. The stability of +1 oxidation state increases in the sequence .....
- Al < Ga < In < Tl
  - Tl < In < Ga < Al
  - In < Tl < Ga < Al
  - Ga < In < Al < Tl

### UNIT-3 : P-BLOCK ELEMENTS-II

1. In which of the following,  $\text{NH}_3$  is not used?
- Nessler's reagent
  - Reagent for the analysis of IV group basic radical
  - Reagent for the analysis of III group basic radical
  - Tollen's reagent
2. Which is true regarding nitrogen?
- least electronegative element
  - has low ionisation enthalpy than oxygen
  - d-orbitals available
  - ability to form  $p\pi - p\pi$  bonds with itself
3. An element belongs to group 15 and 3rd period of the periodic table, its electronic configuration would be .....
- $1s^2 2s^2 2p^4$
  - $1s^2 2s^2 2p^3$
  - $1s^2 2s^2 2p^6 3s^2 3p^2$
  - $1s^2 2s^2 2p^6 3s^2 3p^3$
4. Solid (A) reacts with strong aqueous NaOH liberating a foul smelling gas (B) which spontaneously burns in air giving smoky rings. A and B are respectively .....
- $\text{P}_4$ (red) and  $\text{PH}_3$
  - $\text{P}_4$ (white) and  $\text{PH}_3$
  - $\text{S}_8$  and  $\text{H}_2\text{S}$
  - $\text{P}_4$ (white) and  $\text{H}_2\text{S}$
5. On hydrolysis,  $\text{PCl}_3$  gives .....
- $\text{H}_3\text{PO}_3$
  - $\text{PH}_3$
  - $\text{H}_3\text{PO}_4$
  - $\text{POCl}_3$
6.  $\text{P}_4\text{O}_6$  reacts with cold water to give .....
- $\text{H}_3\text{PO}_3$
  - $\text{H}_4\text{P}_2\text{O}_7$
  - $\text{HPO}_3$
  - $\text{H}_3\text{PO}_4$
7. The basicity of pyrophosphorous acid ( $\text{H}_4\text{P}_2\text{O}_5$ ) is .....
- 4

- (b) 2  
(c) 3  
(d) 5
8. The molarity of given orthophosphoric acid solution is 2M. its normality is .....
- (a) 6N  
(b) 4N  
(c) 2N  
(d) None of these
9. Assertion – bond dissociation energy of fluorine is greater than chlorine gas  
Reason – chlorine has more electronic repulsion than fluorine
- (a) Both assertion and reason are true and reason is the correct explanation of assertion.  
(b) Both assertion and reason are true but reason is not the correct explanation of assertion.  
(c) Assertion is true but reason is false.  
(d) assertion and reason are false.
10. Among the following, which is the strongest oxidizing agent?
- (a)  $\text{Cl}_2$   
(b)  $\text{F}_2$   
(c)  $\text{Br}_2$   
(d)  $\text{I}_2$
11. The correct order of the thermal stability of hydrogen halide is .....
- (a)  $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$   
(b)  $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$   
(c)  $\text{HCl} > \text{HF} > \text{HBr} > \text{HI}$   
(d)  $\text{HI} > \text{HCl} > \text{HF} > \text{HBr}$
12. Which one of the following compounds is not formed?
- (a)  $\text{XeOF}_4$   
(b)  $\text{XeO}_3$   
(c)  $\text{XeF}_2$   
(d)  $\text{NeF}_2$
13. Most easily liquefiable gas is .....
- (a) Ar  
(b) Ne  
(c) He  
(d) Kr
14.  $\text{XeF}_6$  on complete hydrolysis produces .....
- (a)  $\text{XeOF}_4$   
(b)  $\text{XeO}_2\text{F}_4$   
(c)  $\text{XeO}_3$   
(d)  $\text{XeO}_2$
15. Which of the following is strongest acid among all?
- (a) HI  
(b) HF  
(c) HBr  
(d) HCl
16. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?
- (a)  $\text{Br}_2 > \text{I}_2 > \text{F}_2 > \text{Cl}_2$

- (b)  $F_2 > Cl_2 > Br_2 > I_2$   
 (c)  $I_2 > Br_2 > Cl_2 > F_2$   
 (d)  $Cl_2 > Br_2 > F_2 > I_2$
17. Among the following the correct order of acidity is .....
- (a)  $HClO_2 < HClO < HClO_3 < HClO_4$   
 (b)  $HClO_4 < HClO_2 < HClO < HClO_3$   
 (c)  $HClO_3 < HClO_4 < HClO_2 < HClO$   
 (d)  $HClO < HClO_2 < HClO_3 < HClO_4$
18. When copper is heated with cone  $HNO_3$  it produces .....
- (a)  $Cu(NO_3)_2$ , NO and  $NO_2$   
 (b)  $Cu(NO_3)_2$  and  $N_2O$   
 (c)  $Cu(NO_3)_2$  and  $NO_2$   
 (d)  $Cu(NO_3)_2$  and NO

### UNIT-4 : TRANSITION & INNER TRANSITION ELEMENTS

1. Sc ( $Z=21$ ) is a transition element but Zinc ( $z=30$ ) is not because .....
- (a) both  $Sc^{3+}$  and  $Zn^{2+}$  ions are colourless and form white compounds.  
 (b) in case of Sc, 3d orbital are partially filled but in Zn these are completely filled  
 (c) last electron as assumed to be added to 4s level in case of zinc  
 (d) both Sc and Zn do not exhibit variable oxidation states
2. Which of the following d block element has half filled penultimate d sub shell as well as half filled valence sub shell?
- (a) Cr  
 (b) Pd  
 (c) Pt  
 (d) none of these
3. Among the transition metals of 3d series, the one that has highest negative ( $M^{2+}/M$ ) standard electrode potential is .....
- (a) Ti  
 (b) Cu  
 (c) Mn  
 (d) Zn
4. Which one of the following ions has the same number of unpaired electrons as present in  $V^{3+}$ ?
- (a)  $Ti^{3+}$   
 (b)  $Fe^{3+}$   
 (c)  $Ni^{2+}$   
 (d)  $Cr^{3+}$
5. The magnetic moment of  $Mn^{2+}$  ion is .....
- (a) 5.92BM  
 (b) 2.80BM  
 (c) 8.95BM  
 (d) 3.90BM
6. The catalytic behaviour of transition metals and their compounds is ascribed mainly due to .....
- (a) their magnetic behaviour  
 (b) their unfilled d orbitals  
 (c) their ability to adopt variable oxidation states  
 (d) their chemical reactivity



7. The correct order of increasing oxidizing power in the series .....
- $\text{VO}^{+2} < \text{Cr}_2\text{O}_7^{-2} < \text{MnO}_4^{-}$
  - $\text{Cr}_2\text{O}_7^{-2} < \text{VO}^{+2} < \text{MnO}_4^{-}$
  - $\text{Cr}_2\text{O}_7^{-2} < \text{MnO}_4^{-} < \text{VO}^{+2}$
  - $\text{MnO}_4^{-} < \text{Cr}_2\text{O}_7^{-2} < \text{VO}^{+2}$
8. In acid medium, potassium permanganate oxidizes oxalic acid to .....
- Oxalate
  - Carbon dioxide
  - acetate
  - acetic acid
9. Which of the following statements is not true?
- on passing  $\text{H}_2\text{S}$ , through acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  solution, a milky colour is observed.
  - $\text{Na}_2\text{Cr}_2\text{O}_7$  is preferred over  $\text{K}_2\text{Cr}_2\text{O}_7$  in volumetric analysis
  - $\text{K}_2\text{Cr}_2\text{O}_7$  solution in acidic medium is orange in colour
  - $\text{K}_2\text{Cr}_2\text{O}_7$  solution becomes yellow on increasing the pH beyond 7
10. Permanganate ion changes to in acidic medium .....
- $\text{MnO}_2$
  - $\text{Mn}^{2+}$
  - $\text{Mn}^{3+}$
  - $\text{MnO}$
11. A white crystalline salt (A) react with dilute HCl to liberate a suffocating gas (B) and also forms a yellow precipitate . The gas (B) turns potassium dichromate acidified with dil  $\text{H}_2\text{SO}_4$  to a green coloured solution(C). A,B and C are respectively .....
- $\text{Na}_2\text{SO}_3, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
  - $\text{Na}_2\text{S}_2\text{O}_3, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
  - $\text{Na}_2\text{S}, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
  - $\text{Na}_2\text{SO}_4, \text{SO}_2, \text{Cr}_2(\text{SO}_4)_3$
12. The number of moles of acidified  $\text{KMnO}_4$  required to oxidize 1 mole of ferrous oxalate( $\text{FeC}_2\text{O}_4$ ) is .....
- 5
  - 3
  - 0.6
  - 1.5
13. Which one of the following statements related to lanthanons is incorrect?
- Europium shows +2 oxidation state.
  - The basicity decreases as the ionic radius decreases from Pr to Lu.
  - All the lanthanons are much more reactive than aluminium.
  - $\text{Ce}^{4+}$  solutions are widely used as oxidising agents in volumetric analysis.
14. Which of the following lanthanoid ions is diamagnetic?
- $\text{Eu}^{2+}$
  - $\text{Yb}^{2+}$
  - $\text{Ce}^{2+}$
  - $\text{Sm}^{2+}$
15. Which of the following oxidation states is most common among the lanthanoids?
- 4
  - 2
  - 5

- (d) 3
16. Assertion:  $Ce^{4+}$  is used as an oxidizing agent in volumetric analysis.  
Reason:  $Ce^{4+}$  has the tendency of attaining +3 oxidation state.
- (a) Both assertion and reason are true and reason is the correct explanation of assertion.  
 (b) Both assertion and reason are true but reason is not the correct explanation of assertion.  
 (c) Assertion is true but reason is false. .  
 (d) Both assertion and reason are false.
17. The most common oxidation state of actinoids is .....
- (a) +2  
 (b) +3  
 (c) +4  
 (d) +6
18. The actinoid elements which show the highest oxidation state of +7 are .....
- (a) Np, Pu, Am  
 (b) U, Fm, Th  
 (c) U, Th, Md  
 (d) Es, No, Lr
19. Which one of the following is not correct?
- (a)  $La(OH)_2$  is less basic than  $Lu(OH)_3$   
 (b) In lanthanoid series ionic radius of  $Ln^{3+}$  ions decreases  
 (c) La is actually an element of transition metal series rather than lanthanide series  
 (d) Atomic radii of Zr and Hf are same because of lanthanide contraction

### UNIT-5 : COORDINATION CHEMISTRY

1. The sum of primary valance and secondary valance of the metal M in the complex  $[M(en)_2(Ox)]Cl$  is .....
- (a) 3  
 (b) 6  
 (c) -3  
 (d) 9
2. An excess of silver nitrate is added to 100ml of a 0.01M solution of penta aquachlorido chromium (III) chloride. The number of moles of AgCl precipitated would be .....
- (a) 0.02  
 (b) 0.002  
 (c) 0.01  
 (d) 0.2
3. A complex has a molecular formula  $MSO_4Cl \cdot 6H_2O$ . The aqueous solution of it gives white precipitate with Barium chloride solution and no precipitate is obtained when it is treated with silver nitrate solution. If the secondary valance of the metal is six, which one of the following correctly represents the complex?
- (a)  $[M(H_2O)_4Cl] SO_2 \cdot 2H_2O$   
 (b)  $[M(H_2O)_6] SO_4$   
 (c)  $[M(H_2O)_5Cl] SO_4 \cdot H_2O$   
 (d)  $[M(H_2O)_3Cl] SO_4 \cdot 3H_2O$
4. Oxidation state of Iron and the charge on the ligand NO in  $[Fe(H_2O)_5NO] SO_4$  are .....
- (a) +2 and 0 respectively

- (b) +3 and 0 respectively  
 (c) +3 and -1 respectively  
 (d) +1 and +1 respectively
5. As per IUPAC guidelines, the name of the complex  $[\text{Co}(\text{en})_2(\text{ONO})\text{Cl}]\text{Cl}$  is .....
- (a) Chlorobisethylenediaminenitritocobalt (III) chloride  
 (b) chloridobis (ethane-1, 2-diamine) nitro k – Cobaltate (III) chloride  
 (c) chloridobis (ethane-1, 2-diammine) nitrito k – Cobalt (II) chloride  
 (d) chloridobis (ethane-1, 2-diamine) nitro k – Cobalt (III) chloride
6. IUPAC name of the complex  $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$  is .....
- (a) potassiumtrioxalatoaluminium (III)  
 (b) potassiumtrioxalatoaluminate (II)  
 (c) potassiumtrisoxalatoaluminate (III)  
 (d) potassiumtrioxalatoaluminate (III)
7. A magnetic moment of 1.73 BM will be shown by one among the following .....
- (a)  $\text{TiCl}_4$   
 (b)  $[\text{CoCl}_6]^{4-}$   
 (c)  $[\text{Cu}(\text{NH}_3)_4]^{2+}$   
 (d)  $[\text{Ni}(\text{CN})_4]^{2-}$
8. Crystal field stabilization energy for high spin  $d^5$  octahedral complex is .....
- (a)  $-0.6\Delta_0$   
 (b) 0  
 (c)  $2(P - \Delta_0)$   
 (d)  $2(P + \Delta_0)$
9. In which of the following coordination entities the magnitude of  $\Delta_0$  will be maximum?
- (a)  $[\text{Co}(\text{CN})_6]^{3-}$   
 (b)  $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$   
 (c)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$   
 (d)  $[\text{Co}(\text{NH}_3)_6]^{3+}$
10. Which one of the following will give a pair of enantiomorphs?
- (a)  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$   
 (b)  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$   
 (c)  $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_4]$   
 (d)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{NO}_2$
11. Which type of isomerism is exhibited by  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$  ?
- (a) Coordination isomerism  
 (b) Linkage isomerism  
 (c) Optical isomerism  
 (d) Geometrical isomerism
12. How many geometrical isomers are possible for  $[\text{Pt}(\text{Py})(\text{NH}_3)(\text{Br})(\text{Cl})]$  ?
- (a) 3  
 (b) 4  
 (c) 0  
 (d) 15
13. Which one of the following pairs represents linkage isomers?
- (a)  $[\text{Cu}(\text{NH}_3)_4][\text{PtCl}_4]$  and  $[\text{Pt}(\text{NH}_3)_4][\text{CuCl}_4]$   
 (b)  $[\text{Co}(\text{NH}_3)_5(\text{NO}_3)]\text{SO}_4$  and  $[\text{Co}(\text{NH}_3)_5(\text{ONO})]$   
 (c)  $[\text{Co}(\text{NH}_3)_4(\text{NCS})_2]\text{Cl}$  and  $[\text{Co}(\text{NH}_3)_4(\text{SCN})_2]\text{Cl}$

(b) both (b) and (c)

14. Which kind of isomerism is possible for a complex  $[\text{Co}(\text{NH}_3)_4\text{Br}_2]\text{Cl}$  ?

- (a) geometrical and ionization
- (b) geometrical and optical
- (c) optical and ionization
- (d) geometrical only

15. Which one of the following complexes is not expected to exhibit isomerism?

- (a)  $[\text{Ni}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$
- (b)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
- (c)  $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Cl}$
- (d)  $[\text{Fe}(\text{en})_3]^{3+}$

16. A complex in which the oxidation number of the metal is zero is .....

- (a)  $\text{K}_4[\text{Fe}(\text{CN})_6]$
- (b)  $[\text{Fe}(\text{CN})_3(\text{NH}_3)_3]$
- (c)  $[\text{Fe}(\text{CO})_5]$
- (d) both (b) and (c)

17. Formula of tris (ethane-1, 2-diamine) iron (II) phosphate .....

- (a)  $[\text{Fe}(\text{CH}_3 - \text{CH}(\text{NH}_2)_2)_3] (\text{PO}_4)_3$
- (b)  $[\text{Fe}(\text{H}_2\text{N} - \text{CH}_2 - \text{CH}_2 - \text{NH}_2)_3] (\text{PO}_4)$
- (c)  $[\text{Fe}(\text{H}_2\text{N} - \text{CH}_2 - \text{CH}_2 - \text{NH}_2)_3] (\text{PO}_4)_2$
- (d)  $[\text{Fe}(\text{H}_2\text{N} - \text{CH}_2 - \text{CH}_2 - \text{NH}_2)_3] (\text{PO}_4)_2$

18. Which of the following is paramagnetic in nature?

- (a)  $[\text{Zn}(\text{NH}_3)_4]^{2+}$
- (b)  $[\text{Co}(\text{NH}_3)_6]^{3+}$
- (c)  $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
- (d)  $[\text{Ni}(\text{CN})_4]^{2-}$

19. Facmer isomerism is shown by .....

- (a)  $[\text{Co}(\text{en})_3]^{3+}$
- (b)  $[\text{Co}(\text{NH}_3)_4(\text{Cl})_2]^+$
- (c)  $[\text{Co}(\text{NH}_3)_3(\text{Cl})_3]$
- (d)  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$

20. Choose the correct statement.

- (a) Square planar complexes are more stable than octahedral complexes
- (b) The spin only magnetic moment of  $[\text{Cu}(\text{Cl})_4]^{2-}$  is 1.732 BM and it has square planar structure.
- (c) Crystal field splitting energy ( $\Delta_0$ ) of  $[\text{FeF}_6]^{4-}$  is higher than the ( $\Delta_0$ ) of  $[\text{Fe}(\text{CN})_6]^{4-}$
- (d) crystal field stabilization energy of  $[\text{V}(\text{H}_2\text{O})_6]^{2+}$  is higher than the crystal field stabilization of  $[\text{Ti}(\text{H}_2\text{O})_6]^{2+}$

## UNIT-6 : SOLID STATE

1. Graphite and diamond are .....

- (a) Covalent and molecular crystals
- (b) ionic and covalent
- (c) both covalent crystals
- (d) both molecular crystals

2. An ionic compound  $\text{A}_x\text{B}_y$  crystallizes in fcc type crystal structure with B ions at the centre of each face and A ion occupying centre of the cube, the correct formula of A B is .....

- (a) AB

- (b)  $AB_3$
- (c)  $A_3B$
- (d)  $A_8B_6$

3. The ratio of close packed atoms to tetrahedral hole in cubic packing is .....

- (a) 1:1.
- (b) 1:2
- (c) 2:1
- (d) 1:4

4. Solid  $CO_2$  is an example of .....

- (a) Covalent solid
- (b) metallic solid
- (c) molecular solid
- (d) ionic solid

5. Assertion: monoclinic sulphur is an example of monoclinic crystal system.

Reason: for a monoclinic system,  $a \neq b \neq c$  and  $\alpha = \gamma = 90^\circ$ ,  $\beta \neq 90^\circ$ .

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Both assertion and reason are false.

6. In calcium fluoride, having the fluorite structure the coordination number of  $Ca^{2+}$  ion and F ion are

.....

- (a) 4 and 2
- (b) 6 and 6
- (c) 8 and 4
- (d) 4 and 8

7. The number of unit cells in 8gm of an element X (atomic mass 40) which crystallizes in bcc pattern is ( $N_A$  is the Avogadro number)

- (a)  $6.023 \times 10^{23}$
- (b)  $6.023 \times 10^{22}$
- (c)  $60.23 \times 10^{23}$
- (d)  $(6.023 \times 10^{23} \times 40)$

8. In a solid atom M occupies ccp lattice and  $\frac{1}{4}$  of tetrahedral voids are occupied by atom N. Find the formula of solid formed by M and N.

- (a) MN
- (b)  $M_3N$
- (c)  $MN_3$
- (d)  $M_3N_2$

9. The ionic radii of  $A^+$  and  $B^-$  are  $0.98 \times 10^{-10}$  m and  $1.81 \times 10^{-10}$  m, the coordination number of each ion in AB is .....

- (a) 8
- (b) 2
- (c) 6
- (d) 4

10. CaCl has bcc arrangement, its unit cell edge length is 400pm, its inter atomic distance is .....

- (a) 400pm
- (b) 800pm
- (c)  $\frac{400}{\sqrt{3}}$  pm

(d)  $(3\sqrt{2}) \times 400 \text{ pm}$

11. A solid compound XY has NaCl structure, if the radius of the cation is 100pm, the radius of the anion will be .....

- (a) 1000.414
- (b) 0.732100
- (c)  $100 \times 0.414$
- (d)  $(0.414/100)$

12. The vacant space in bcc lattice unit cell is .....

- (a) 48%
- (b) 23%
- (c) 32%
- (d) 26%

13. The radius of an atom is 300pm, if it crystallizes in a face centered cubic lattice, the length of the edge of the unit cell is .....

- (a) 488.5pm
- (b) 848.5pm
- (c) 884.5pm
- (d) 484.5pm

14. The fraction of total volume occupied by the atoms in a simple cubic is .....

- (a)  $(\pi/4)\sqrt{2}$
- (b)  $(\pi/6)$
- (c)  $(\pi/4)$
- (d)  $(\pi/3)\sqrt{2}$

15. The yellow colour in NaCl crystal is due to .....

- (a) excitation of electrons in F centers
- (b) reflection of light from  $\text{Cl}^-$  ion on the surface
- (c) refraction of light from  $\text{Na}^+$  ion
- (d) all of the above

16. If 'a' stands for the edge length of the cubic system; sc, bcc, and fcc. Then the ratio of radii of spheres in these systems will be respectively.

- (a)  $\left(\frac{1}{2}a : \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a\right)$
- (b)  $(\sqrt{1}a : \sqrt{3}a : \sqrt{2}a)$
- (c)  $\left(\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a\right)$
- (d)  $\left(\frac{1}{2}a : \sqrt{3}a : \frac{1}{\sqrt{2}}a\right)$

17. If a is the length of the side of the cube, the distance between the body centered atom and one corner atom in the cube will be .....

- (a)  $(2\sqrt{3})a$
- (b)  $(4\sqrt{3})a$
- (c)  $(3\sqrt{4})a$
- (d)  $(3\sqrt{2})a$

18. Potassium has a bcc structure with nearest neighbor distance 4.52 Å. Its atomic weight is 39. Its density will be .....

- (a)  $915 \text{ kg m}^{-3}$

- (b)  $2142 \text{ kg m}^{-3}$
- (c)  $452 \text{ kg m}^{-3}$
- (d)  $390 \text{ kg m}^{-3}$

19. Schottky defect in a crystal is observed when .....

- (a) unequal number of anions and anions are missing from the lattice
- (b) equal number of anions and anions are missing from the lattice
- (c) an ion leaves its normal site and occupies an interstitial site
- (d) no ion is missing from its lattice.

20. The cation leaves its normal position in the crystal and moves to some interstitial position, the defect in the crystal is known as .....

- (a) Schottky defect
- (b) F center
- (c) Frenkel defect
- (d) non-stoichiometric defect

21. Assertion – due to Frenkel defect, density of the crystalline solid decreases.

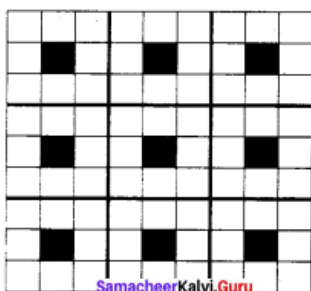
Reason – in Frenkel defect cation and anion leaves the crystal.

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Both assertion and reason are false

22. The crystal with a metal deficiency defect is .....

- (a) NaCl
- (b) FeO
- (c) ZnO
- (d) KCl

23. Two dimensional solid pattern formed by two different atoms X and Y is shown below. The black and white squares represent atoms X and Y respectively. The simplest formula for the compound based on the unit cell from the pattern is .....



- (a)  $\text{XY}_8$
- (b)  $\text{X}_4\text{Y}_9$
- (c)  $\text{XY}_2$
- (d)  $\text{XY}_4$

### UNIT-7 : CHEMICAL KINETICS

1. For a first order reaction  $\text{A} \rightarrow \text{B}$  the rate constant is  $x \text{ min}^{-1}$ . If the initial concentration of A is 0.01 M, the concentration of A after one hour is given by the expression.

- (a)  $0.01 e^{-x}$
- (b)  $1 \times 10^{-2} (1 - e^{-60x})$
- (c)  $(1 \times 10^{-2}) e^{-60x}$

(d) none of these

2. A zero order reaction  $X \rightarrow \text{Product}$ , with an initial concentration 0.02M has a half life of 10 min. If one starts with concentration 0.04M, then the half life is .....

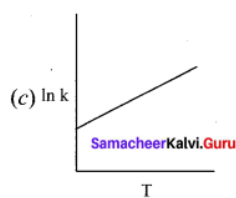
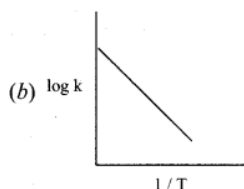
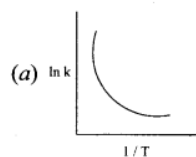
(a) 10 s

(b) 5 min

(c) 20 min

(d) cannot be predicted using the given information

3. Among the following graphs showing variation of rate constant with temperature (T) for a reaction, the one that exhibits Arrhenius behavior over the entire temperature range is .....



(d) both (b) and (c)

4. For a first order reaction  $A \rightarrow \text{product}$  with initial concentration  $x \text{ mol L}^{-1}$ , has a half life period of 2.5 hours. For the same reaction with initial concentration  $\text{mol L}^{-1}$  the half life is

(a)  $(2.5 \times 2)$  hours

(b)  $(2.5/2)$  hours

(c) 2.5 hours

(d) Without knowing the rate constant,  $t_{1/2}$  cannot be determined from the given data

5. For the reaction,  $2\text{NH}_3 \rightarrow \text{N}_2 + 3\text{H}_2$ , if

$$\frac{-d[\text{NH}_3]}{dt} = k_1[\text{NH}_3], \quad \frac{d[\text{N}_2]}{dt} = k_2[\text{NH}_3], \quad \frac{d[\text{H}_2]}{dt} = k_3[\text{NH}_3]$$

then the relation between

$k_1$ ,  $k_2$  and  $k_3$  is

(a)  $k_1 = k_2 = k_3$

(b)  $k_1 = 3 k_2 = 2 k_3$

(c)  $1.5k_1 = 3 k_2 = k_3$

(d)  $2k_1 = k_2 = 3 k_3$

6. The decomposition of phosphine ( $\text{PH}_3$ ) on tungsten at low pressure is a first order reaction. It is because the .....

(a) rate is proportional to the surface coverage

(b) rate is inversely proportional to the surface coverage

(c) rate is independent of the surface coverage

(d) rate of decomposition is slow



7. For a reaction  $\text{Rate} = k [\text{acetone}]^{3/2}$  then unit of rate constant and rate of reaction respectively is

.....

- (a)  $(\text{mol L}^{-1} \text{ s}^{-1}), (\text{mol}^{-1/2} \text{ L}^{1/2} \text{ s}^{-1})$
- (b)  $(\text{mol}^{-1/2} \text{ L}^{1/2} \text{ s}^{-1}), (\text{mol L}^{-1} \text{ s}^{-1})$
- (c)  $(\text{mol}^{1/2} \text{ L}^{1/2} \text{ s}^{-1}), (\text{mol L}^{-1} \text{ s}^{-1})$
- (d)  $(\text{mol L s}^{-1}), (\text{mol}^{1/2} \text{ L}^{1/2} \text{ s})$

8. The addition of a catalyst during a chemical reaction alters which of the following quantities?

- (a) Enthalpy
- (b) Activation energy
- (c) Entropy
- (d) Internal energy

9. Consider the following statements:

- (i) increase in the concentration of the reactant increases the rate of a zero-order reaction.
- (ii) rate constant  $k$  is equal to collision frequency  $A$  if  $E_a = 0$
- (iii) rate constant  $k$  is equal to collision frequency  $A$  if  $E_a = 0$
- (iv) a plot of  $\ln(k)$  vs  $T$  is a straight line.
- (v) a plot of  $\ln(k)$  vs  $(1/T)$  is a straight line with a positive slope.

Correct statements are

- (a) (ii) only
- (b) (ii) and (iv)
- (c) (ii) and (v)
- (d) (i), (ii) and (v)

10. In a reversible reaction, the enthalpy change and the activation energy in the forward direction are respectively  $-x \text{ kJ mol}^{-1}$  and  $y \text{ kJ mol}^{-1}$ . Therefore, the energy of activation in the backward direction is

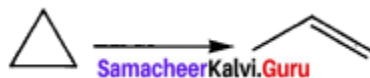
.....

- (a)  $(y - x) \text{ kJ mol}^{-1}$
- (b)  $(x + y) \text{ J mol}^{-1}$
- (c)  $(x - y) \text{ kJ mol}^{-1}$
- (d)  $(x + y) \times 10^3 \text{ J mol}^{-1}$

11. What is the activation energy for a reaction if its rate doubles when the temperature is raised from 200K to 400K? ( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ )

- (a)  $234.65 \text{ kJ mol}^{-1} \text{ K}^{-1}$
- (b)  $434.65 \text{ kJ mol}^{-1} \text{ K}^{-1}$
- (c)  $434.65 \text{ J mol}^{-1} \text{ K}^{-1}$
- (d)  $334.65 \text{ J mol}^{-1} \text{ K}^{-1}$

12.



This reaction follows first order kinetics. The rate constant at particular temperature is  $2.303 \times 10^2 \text{ hour}^{-1}$ . The initial concentration of cyclopropane is 0.25 M. What will be the concentration of cyclopropane after 1806 minutes? ( $\log 2 = 0.3010$ )

- (a) 0.125 M
- (b) 0.215 M
- (c)  $0.25 \times 2.303 \text{ M}$
- (d) 0.05 M

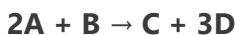
13. For a first-order reaction, the rate constant is  $6.909 \text{ min}^{-1}$ . The time taken for 75% conversion in minutes is .....

- (a) (32) log 2
- (b) (32) log 2
- (c) (32) log (34)
- (d) (23) log (43)

14. In a first-order reaction  $x \rightarrow y$ ; if  $k$  is the rate constant and the initial concentration of the reactant  $x$  is 0.1 M, then, the half-life is .....

- (a)  $(\log 2k)$
- (b)  $(0.693(0.1)k)$
- (c)  $(\ln 2k)$
- (d) none of these

15. Predict the rate law of the following reaction based on the data given below:



Reaction number	[A] (min)	[B] (min)	Initial rate (M s <sup>-1</sup> )
1	0.1	0.1	$x$
2	0.2	0.1	$2x$
3	0.1	0.2	$4x$
4	0.2	0.2	$8x$

- (a) rate =  $k [A]^2 [B]$
- (b) rate =  $k [A][B]^2$
- (c) rate =  $k [A][B]$
- (d) rate =  $k [A]^{1/2} [B]^{3/2}$

16. Assertion: rate of reaction doubles when the concentration of the reactant is doubled if it is a first-order reaction.

Reason: rate constant also doubles

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
- (c) Assertion is true but reason is false.
- (d) Both assertion and reason are false.

17. The rate constant of a reaction is  $5.8 \times 10^2 \text{ s}^{-1}$ . The order of the reaction is .....

- (a) First order
- (b) zero-order
- (c) Second-order
- (d) Third order

18. For the reaction,  $N_2 O_{5(g)} \rightarrow 2NO_{2(g)} + 1/2 O_{2(g)}$  the value of the rate of disappearance of  $N_2 O_5$  is given as  $6.5 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1}$ . The rate of formation of  $NO_2$  and  $O_2$  is given respectively as .....

- (a)  $(3.25 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1})$  and  $(1.3 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1})$
- (b)  $(1.3 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1})$  and  $(3.25 \times 10^2 \text{ mol L}^{-1} \text{ s}^{-1})$
- (c)  $(1.3 \times 10^{-1} \text{ mol L}^{-1} \text{ s}^{-1})$  and  $(3.25 \times 10^{-2} \text{ mol L}^{-1} \text{ s}^{-1})$
- (d) None of these

19. During the decomposition of  $H_2O_2$  to give dioxygen, 48g  $O_2$  is formed per minute at a certain point in time. The rate of formation of water at this point is .....

- (a)  $0.75 \text{ mol min}^{-1}$
- (b)  $1.5 \text{ mol min}^{-1}$
- (c)  $2.25 \text{ mol min}^{-1}$
- (d)  $3.0 \text{ mol min}^{-1}$

20. If the initial concentration of the reactant is doubled, the time for half-reaction is also doubled. Then

the order of the reaction is .....

- (a) Zero
- (b) one
- (c) Fraction
- (d) none

21. In a homogeneous reaction  $A \rightarrow B + C + D$ , the initial pressure was  $P_0$  and after time  $t$  it was  $P$ .

Expression for rate constant in terms of  $P_0$ ,  $P$  and  $t$  will be .....

(a)  $k = \left( \frac{2.303}{t} \right) \log \left( \frac{2P_0}{3P_0 - P} \right)$

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(b)  $k = \left( \frac{2.303}{t} \right) \log \left( \frac{2P_0}{P_0 - P} \right)$

(c)  $k = \left( \frac{2.303}{t} \right) \log \left( \frac{3P_0 - P}{2P_0} \right)$

(d)  $k = \left( \frac{2.303}{t} \right) \log \left( \frac{2P_0}{3P_0 - 2P} \right)$

22. If 75% of a first-order reaction was completed in 60 minutes, 50% of the same reaction under the same conditions would be completed in .....

- (a) 20 minutes
- (b) 30 minutes
- (c) 35 minutes
- (d) 75 minutes

23. The half-life period of a radioactive element is 140 days. After 560 days, 1 g of the element will be reduced to

- (a) 12 g
- (b) 14 g
- (c) 18 g
- (d) 116 g

24. The correct difference between first and second-order reactions is that .....

- (a) A first-order reaction can be catalysed a second-order reaction cannot be catalysed.
- (b) The half-life of a first-order reaction does not depend on  $[A_0]$  the half-life of a second-order reaction does depend on  $[A_0]$ .
- (c) The rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations.
- (d) The rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations.

25. After 2 hours, a radioactive substance becomes  $(1/16)$ th of original amount. Then the half life (in min) is .....

- (a) 60 minutes
- (b) 120 minutes
- (c) 30 minutes
- (d) 15 minutes

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