UNIT TEST-3 CHENNAI DISTRICT
SCIENCE ANSWER KEY-2024

PART-I

1. B)20khz
2. D)none of the above
3. B)combination reaction
4. C)$1*10^{-11}$
5. C)jean baptiste lamarch
6. A)radio- carbon method
7. C)recombinant of vector dna &desired dna
8. A)IR8
9. B)restriction endonucleases

PART-II

10. When humidity **increases**, the speed of sound increases. Hence, sound travels faster on a rainy day than a dry day.
11. decomposition reaction
    7.4
12. Archaeopteryx is considered to be a connecting link between reptiles and birds as it had wings with feathers like a bird and had a long tail, clawed digits and conical teeth like a reptile.
13. Embryonic stem cell and Adult stem cell or somatic stem cell, are the two types of stem cells.
14. The cancerous cell migrate to distant Parts of the body affect new tissues. This process is called metastasis.
15. Frequency of sound = velocity of sound / wavelength of sound
    n=v/λ=331/0.20 = 1655HZ

PART-III

16. **A)** An echo is the sound reproduced due to the reflection of the original sound wave. **B) (i)** The persistence of hearing for human ears is 0.1 second. This means that you can hear two sound waves clearly, if the time interval between the two sounds is at least 0.1 s. Thus, the minimum time gap between the original sound and an echo must be 0.1 s. **ii)** The above criterion can be satisfied only when the distance between the source of sound.
17.

Reversible reaction	Irreversible reaction
It can be reversed under suitable conditions.	It cannot be reversed.
Both forward and backward reactions take place simultaneously.	It is unidirectional. It proceeds only in forward direction.
It attains equilibrium.	Equilibrium is not attained.
The reactants cannot be converted completely into products.	The reactants can be completely converted into products.
It is relatively slow.	It is fast. SamacheerKalvi.Guide

18. It provides traditional uses of plant. It gives information about certain unknown and known useful plants. The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine. Tribal communities utilize ethnomedicinal plant parts like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of

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diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.

19. The characters developed by the animals during their life time in response to the environmental changes are called acquired character. The acquired characters are transmitted to the offspring by the process of inheritance.

20. $KOH \rightarrow K^+ + OH^-$

$pOH = -\log[OH^-]$

$= -\log [1 \times 10^{-5}]$

pOH = 5

$pH + pOH = 14$

$\therefore$ pH of KOH = 14 – 5 = 9

pH = 9

PART-IV

21. **Ultrasonic Vibration**: The vibrations whose frequencies are **greater than 20000 Hz** are called ultrasonic vibrations.

(b) (i) They are used in **SONAR** to measure the depth of the sea (or ocean) and to locate underwater objects.

(ii) It is used for **scanning and imaging the position** and growth of a **foetus** and presence of stones in the **gall bladder and kidney.**

(iii) It is used for homogenising milk in milk plants where fresh milk is agitated with the desired quantity of **fat and powdered milk to obtain toned milk.**

(c) Mosquito, Dogs and Bats are the three animals that can hear ultrasonic vibrations.

OR

Effect of density: The velocity of sound in a gas is inversely proportional to the square root of the density of the gas. Hence, the velocity decreases as the density of the gas increases. $v \propto \sqrt{1/d}$

Effect of temperature:

(i) The velocity of sound in a gas is directly proportional to the square root of its temperature.

(ii) The velocity of sound in gas increases with the increase in temperature,

$v \propto \sqrt{T}$ Velocity at temperature T is given by the following equation:

$v_T = (v_0 + 0.61\ T)\ ms^{-1}$

Here, v_0 is the velocity of sound in the gas at **0° C. For air, v_0 = 331 ms^{-1}.** Hence, the velocity of sound changes by **0.61** ms^{-1} when the temperature changes by one – degree celsius.

Effect of relative humidity: When humidity increases, the speed of sound increases. That is why we can hear sound from long distances clearly during rainy seasons.

22. **Nature of the reactants**: The reaction of sodium with hydrochloric acid is faster than that with acetic acid, because Hydrochloric acid is a stronger acid than acetic acid and thus more reactive. So, the nature of the reactants influence the reaction rate.

$2Na_{(s)} + 2HCl_{(aq)} \rightarrow 2NaCl_{(aq)} + H_{2(g)}$ (fast)

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$2Na_{(s)} + 2CH_3COOH_{(aq)} \rightarrow 2CH_3COONa_{(aq)} + H_{2(g)}$ (slow)

Concentration of the reactants: Changing the amount of the reactants also increases the reaction rate. More the concentration, more particles per volume exist in it and hence faster the reaction. Granulated zinc reacts faster with 2M hydrochloric acid than 1M hydrochloric acid.

Temperature : Most of the reactions go faster at higher temperature. Because adding heat to the reactants provides energy to break more bonds and thus speed up the reaction. Calcium carbonate reacts slowly with hydrochloric acid at room temperature. When the reaction mixture is heated the reaction rate increases.

Pressure: If the reactants are gases, increasing their pressure increases the reaction rate. This is because, on increasing the pressure the reacting particles come closer and collide frequently.

Catalyst: A catalyst is a substance which increases the reaction rate without being consumed in the reaction. In certain reactions, adding a substance as catalyst speeds up the reaction. For example, on heating potassium chlorate, it decomposes into potassium chloride and oxygen gas, but at a slower rate. If manganese dioxide is added, it increases the reaction rate.

Surface area of the reactants: Powdered calcium carbonate reacts more readily with hydrochloric acid than marble chips. Because, powdering of the reactants increases the surface area and more energy is available on collision of the reactant particles. Thus, the reaction rate is increased.

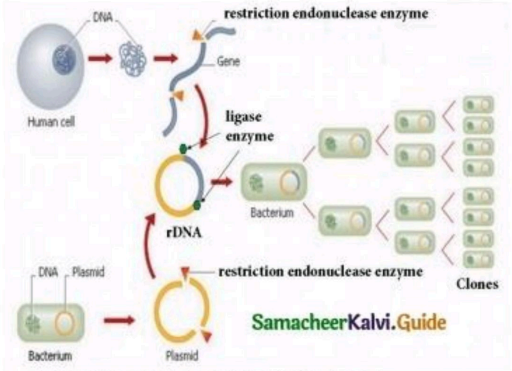
OR

There are two major classes of **double displacement reactions**. They are,

(i) **Precipitation Reactions:** When aqueous solutions of two compounds are mixed, if they react to form an insoluble compound and a soluble compound, then it is called precipitation reaction. **$Pb(NO3)2(aq)+2KI(aq) \rightarrow PbI2(s)\downarrow + 2KNO3(aq)$**

(ii) **Neutralisation Reactions:** Another type of displacement reaction in which the acid reacts with the base to form a salt and water. It is called 'neutralisation reaction' as both acid and base neutralize each other. **$NaOH(aq)+HCl(aq) \rightarrow NaCl(aq)+H2O(l)$.**

23.



Genetic engineering technique (Gene cloning)

In gene cloning, a gene or a piece of DNA fragment is inserted into a bacterial cell where DNA will be multiplied (copied) as the cell divides.
A brief outline of the basic steps involved in gene cloning are:

1. Isolation of desired DNA fragment by using restriction enzymes.
2. Insertion of the DNA fragment into a suitable vector (Plasmid) to make rDNA.
3. Transfer of rDNA into bacterial host cell (Transformation)
4. Selection and multiplication of recombinant host cell to get a clone.
5. Expression of cloned gene in host cell.
   Using this strategy several enzymes, hormones and vaccines can be produced.

OR

Using genetic engineering techniques, medicinally important valuable proteins or polypeptides, which form the potential pharmaceutical products for the treatment of various diseases, have been developed on a commercial scale.
Pharmaceutical products developed by rDNA technique:

- Insulin used in the treatment of diabetes.
- Human growth hormone used for treating children with growth deficiencies.
- Blood clotting factors are developed to treat haemophilia.
- Tissue plasminogen activator is used to dissolve blood clots and to prevent heart attack.

- Development of vaccines against various diseases like hepatitis B and rabies.

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