

JEE Main - 2023

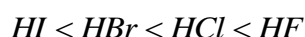
Chemistry

Answers

Section A

1. Correct Answer: C

The polarity increasing in the order is



Bond formation is exothermic. Absolutely pure water does not contain any ions is false because pure water, has an amphiprotic nature. This means that small amount of ions will form in pure water

Chemical bond formation take place when force of attraction overcome the forces of repulsion is true because the bond is result from the electrostatic force of attraction between oppositely charged ions as in ionic bonds or through the sharing of electrons as in covalent bonds

In co-valency transference of electron takes place is wrong because he formation of an ionic bond is the result of the transfer of one or more electrons from a metal onto a non-metal.

2. Correct Answer: B

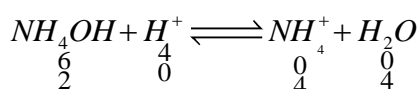
$NaHCO_3$ have Na^+H^+ and CO_3^- ions

3. Correct Answer: B

Given pK_b of $NH_4OH = 4.7$

20 mL of $0.1M H_2SO_4 \Rightarrow n_{H^+} = 4$

30 ml $0.2M NH_4OH \Rightarrow n_{NH_4OH} = 6$



Solution is basic buffer.

$$pOH = pK_b + \log \frac{[NH_4^+]}{[NH_4OH]} = 4.7 + \log \left(\frac{4}{2} \right)$$

$$= 4.7 + \log 2$$

$$= 4.7 + 0.3$$

$$= 5$$

$$pH = 14 - pOH$$

$$= 14 - 5 = 9$$

Hence option (b) is the answer.

4. Correct Answer: B

5. Correct Answer: A

6. Correct Answer: C

A-Polyurethane - amorphous solid

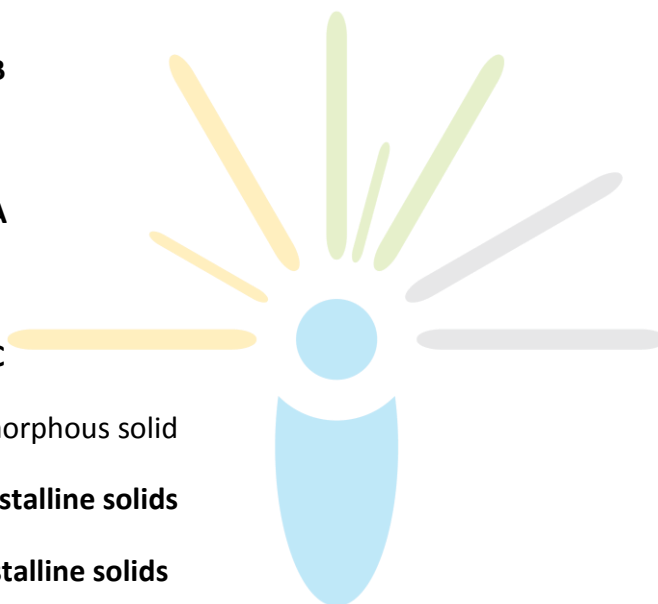
B-Naphthalene - crystalline solids

C-Benzoic acid - crystalline solids

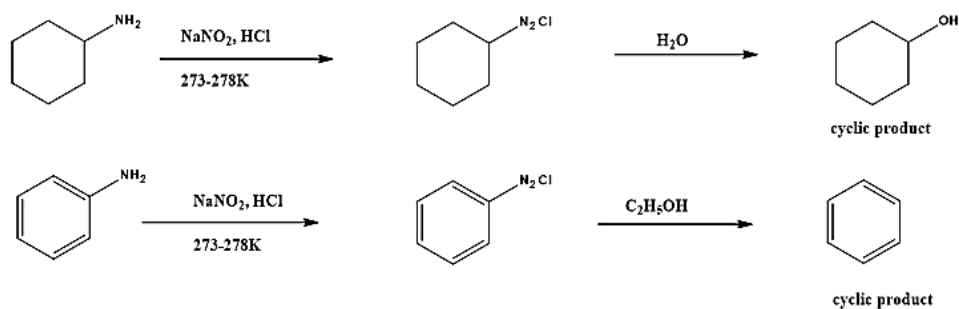
D-Teflon - amorphous solids

E-Potassium nitrate - crystalline solids

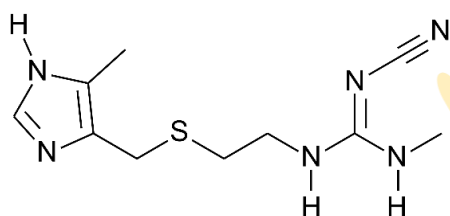
F-Cellophane - amorphous solids



7. Correct Answer: C



8. Correct Answer: D



9. Correct Answer: D

[Hint: Molar and volume ratio will be same, i.e., 1 : 1]

∴ Mass of 1 mole CH_4 and He will be 16 and 4g respectively.

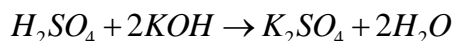
$$\text{Percentage by mass of } CH_4 = \frac{\text{Mass of } CH_4}{\text{Total mass}} \times 100$$

$$= \frac{16}{20} \times 100 = 80\%$$

10. Correct Answer: C

Chlorophyll contains magnesium instead of calcium.

11. Correct Answer: C



$$1M_1V_1(\text{excess } H_2SO_4) = 2M_2V_2(KOH)$$

$$10.1 \times V_1 = 20.5 \times 20$$

$$V_1 = 50\text{mL}$$

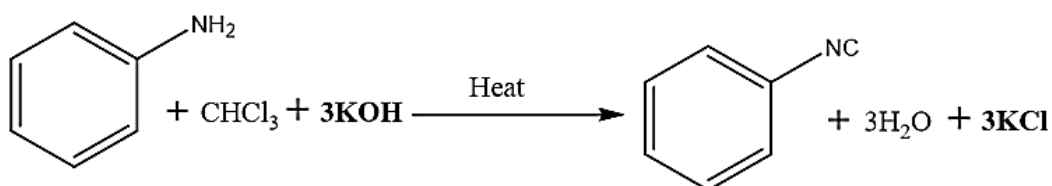
Volume of sulphuric acid used up to absorb $NH_3 = 50\text{mL}$

$$\%N = W \times 2.8 \times MV = 0.32.8 \times 0.1 \times 50 = 46.6$$

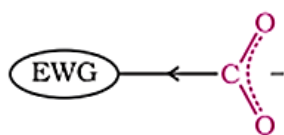
Thus, the organic compound will be urea, which has 46.6% nitrogen

Urea has C and N atoms in the ratio 1:2.

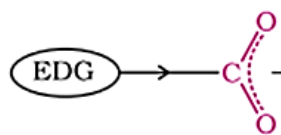
12. Correct Answer: A



13. Correct Answer: B



Electron withdrawing group (EWG) stabilises the carboxylate anion and strengthens the acid



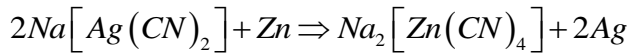
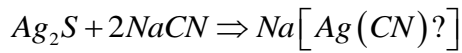
Electron donating group (EDG) destabilises the carboxylate anion and weakens the acid

14. Correct Answer: B

RNA has ribose sugar and uracil base.

15. Correct Answer: B

Silver ore forms a soluble complex with $NaCN$ from which silver is precipitated using scrap zinc

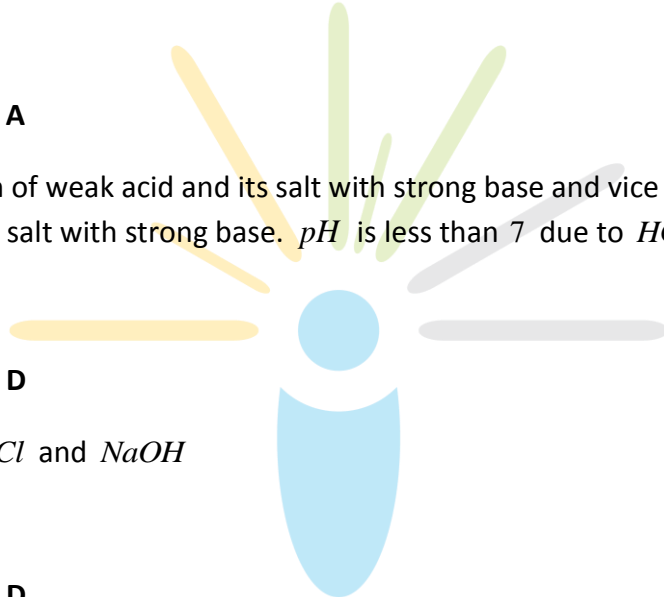


16. Correct Answer: C

Alum furnishes Al^{3+} ions which about coagulation of negatively charged clay particles bacteria etc.

17. Correct Answer: A

A buffer is a solution of weak acid and its salt with strong base and vice versa. HCl is strong acid and $NaCl$ is its salt with strong base. pH is less than 7 due to HCl .



18. Correct Answer: D

ZnO reacts with HCl and $NaOH$

19. Correct Answer: D

Reductional potential is least for B. Hence B is the best reductant.

20. Correct Answer: B

Given time period T

$$T \propto P^a d^b E^c$$

$$T = kP^a d^b E^c \dots\dots\dots \text{eq(1)}$$

Where K is a constant of proportionality and dimensionless quantity.

Inserting the dimensions of Time, pressure, density and Energy in equation (1)

we get

$$[T] = [ML^{-1}T^{-2}]^a [ML^{-3}]^b [ML^2T^{-2}]^c$$

Equating powers of M, L, T on both sides we get

$$0 = a + b + c \dots (2)$$

$$0 = -a - 3b + 2c \dots (3)$$

$$1 = -2a - 2c \dots (4)$$

By solving (2), (3), (4)

$$a = \frac{-5}{6}, b = \frac{1}{2} \text{ and } c = \frac{1}{3}$$



Section-B

21. Answer: 120

The Bond angle between C_1 and O is 120°

22. Answer: 7

25 ml of barium hydroxide solution requires 35 ml of 0.1M (or 0.1N) HCl solution. First, we calculate the normality of the solution using the formula given below:

$$N_1 \times V_1 = N_2 \times V_2$$

$$25 \times N_1 = 0.1 \times 35$$

$$N_1 = 0.14N$$

1 mole of barium hydroxide reacts with 2 moles of HCl .

Hence, the molarity of barium hydroxide is one half its normality.

It is equal to $\frac{0.14}{2}$ or 0.07M.

23. Answer: 34

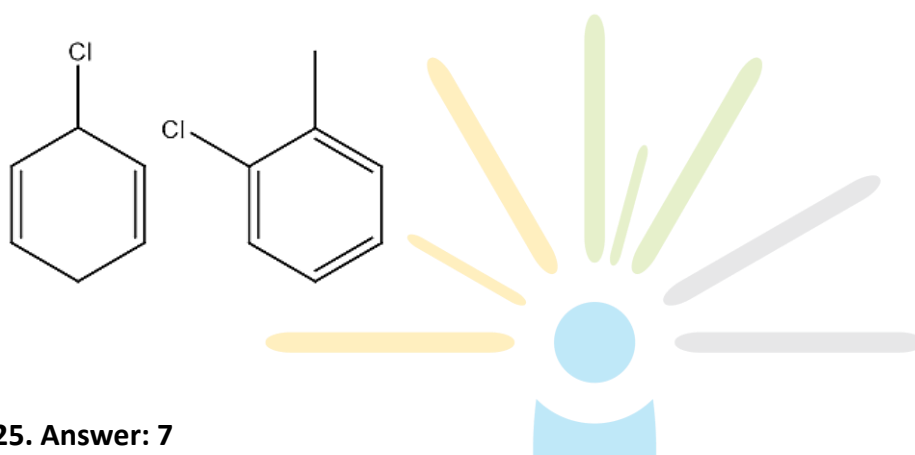
Applying first order kinetic equation.

$$t = \frac{2.303}{k} \log_{10} \frac{a}{(a-x)}$$

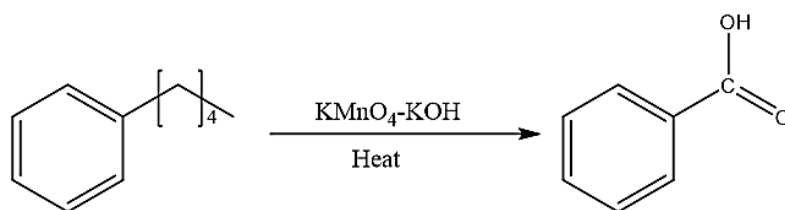
Given: $k = 15 \times 10^{-3} \text{ sec}^{-1}$, $a = 5\text{g}$, $(a-x) = 3\text{g}$

$$\text{So, } t = \frac{2.303}{15 \times 10^{-3}} \log_{10} \frac{5}{3} = 34.07 \text{ sec}$$

24. Answer: 2



25. Answer: 7

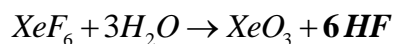
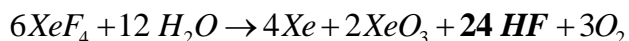


26. Answer: 3

$[Ni(CO)_4]$ oxidation state of Ni is 0

$K_3[Al(C_2O_4)_3]$ oxidation state of Al is 3

27. Answer: 4



$$XeF_4 : XeF_6 = 26 : 6 = 4$$

28. Answer: 3

In the case of 2,3-dihydroxybutanedioic acid, known as tartaric acid, the two chiral centers have the same four substituents and are equivalent. As a result, two of the four possible stereoisomers of this compound are identical due to a plane of symmetry, so there are only three stereoisomeric tartaric acids.

29. Answer: 2

Calculate the emf of the following cell at 25°C:



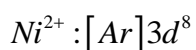
$$E_{\text{cell}} = \frac{0.0591}{2} \log \frac{P_1}{P_2}$$

$$= \frac{0.0591}{2} \log \frac{2}{10}$$

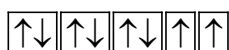
$$= -0.0206 \text{ volt}$$

30. Correct Answer: 3

The correct option is $C\sqrt{8BM}$



Ni^{2+} has $3d^8$ as outer electronic configuration.



2 unpaired electrons

It has 2 unpaired electrons. The spin only magnetic moment of Ni^{2+} in aqueous solution would be:

$$\mu = \sqrt{n(n+2)}$$

$$\mu = \sqrt{2(2+2)} = \sqrt{8}BM$$

$$= 2.824 \approx 3.0$$

