Section – 1 *CHEMISTRY*

1. The number of oxygen atoms in 4.4 g of CO_2 is.
(A) 1.2×10^{23} (B) 6×10^{22} (C) 6×10^{23} (D) 12×10^{23}

2. If $n=6$ the correct sequence for filling of electrons will be
(A) $ns\longrightarrow(n-1)d\longrightarrow(n-2)f\longrightarrow np$ (B) $ns\longrightarrow(n-2)f\longrightarrow np\longrightarrow(n-1)d$
(C) $ns\longrightarrow np\longrightarrow(n-1)d\longrightarrow(n-2)f$ (D) $ns\longrightarrow(n-2)f\longrightarrow(n-1)d\longrightarrow np$

3. The root mean square speeds at STP for the gases H_2,N_2,O_2 and HBr are in the order
(A) $H_2<N_2<O_2<HBr$ (B) $HBr<O_2<N_2<H_2$ (C) $H_2<N_2=O_2<HBr$ (D) $HBr<O_2<H_2<N_2$

4. In a closed insulated container a liquid is stirred with a paddle to increase the temperature, which of following is true?
(A) $\Delta E=W\neq0,\ q=0$ (B) $\Delta E=W=0,\ q\neq0$ (C) $\Delta E=0, W=q\neq0$ (D) $W=0,\Delta E=q\neq0$

5. From the given reactions $S(s)+\frac{3}{2}O_2(g)\longrightarrow SO_3(g)+2x\,kcal$; $SO_2(g)+\frac{1}{2}O_2(g)\longrightarrow SO_3(g)+y\ kcal$, the heat of formation of SO_2 is
(A) $(x+y)$ (B) $(x-y)$ (C) $(2x+y)$ (D) $(2x-y)$

6. If the concentration of OH^- ions in the reaction, $Fe(OH)_3(s)\rightleftharpoons Fe^{3+}(aq)+3OH^-(aq)$ is decreased by ¼ times, then equilibrium concentration of Fe^{3+} will increase by
(A) 8 times (B) 16 times (C) 64 times (D) 4 times

7. The strongest conjugate base is
(A) NO_3^- (B) Cl^- (C) SO_4^{2-} (D) CH_3COO^-

8. In the fluorite structure, the coordination number of Ca^{2+} ions is
(A) 4 (B) 6 (C) 8 (D) 3

9. Which one of the following salts will have the same value of van't Hoff factor (i) as that of $K_4[Fe(CN)_6]$?
(A) $AL_2(SO_4)_3$ (B) $NaCl$ (C) $Al(NO_3)_3$ (D) Na_2SO_4

10. Reduction potential for the following half/cell reaction are $Zn\longrightarrow Zn^{2+}+2e^-$, $\left(E^\circ_{(Zn^{2+}/Zn)}=-0.76V\right)$, $Fe\longrightarrow Fe^{2+}+2e^-,\left(E^\circ_{Fe^{2+}/Fe}=-0.44V\right)$ The EMF for the cell reaction $Fe^{2+}+Zn\longrightarrow Zn^{2+}+Fe$ will be
(A) $+0.32\ V$ (B) $-0.32V$ (C) $+1.20\ V$ (D) $-1.20\ V$

11. If 60% of a first order reaction was completed in 60 min, 50% of the same reaction would be completed in approximately (log 4=0.60, log 5=0.69)
(A) 50 min (B) 45 min (C) 60 min (D) 40 min

12. For adsorption of a gas on a solid, the plot of $\log\frac{x}{m}$ vs $\log p$ is linear with slope equal to (n being a whole numbers)
(A) k (B) $\log k$ (C) n (D) 1/ n

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13. Na^+, Mg^{2+}, Al^{3+} and Si^{4+} are isoelectronic, The order of their ionic size, is

(A) $Na^+ > Mg^{2+} < Al^{3+} < Si^{4+}$ (B) $Na^+ < Mg^{2+} > Al^{3+} > Si^{4+}$

(C) $Na^+ > Mg^{2+} > Al^{3+} > Si^{4+}$ (D) $Na^+ < Mg^{2+} > Al^{3+} < Si^{4+}$

14. Which of the following has $p\pi - d\pi$ bonding?

(A) NO_3^- (B) SO_3^{2-} (C) BO_3^{3-} (D) CO_3^{2-}

15. In PO_4^{3-} ion, the formal charge on each oxygen atom an $P-O$ bond order respectively are

(A) –0.75, 0.6 (B) $-0.75, 1.0$ (C) $-0.75, 1.25$ (D) $-3, 1.25$

16. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is

(A) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$ (B) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$

(C) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$ (D) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

17. Name the type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared?

(A) sheet silicate (B) Pyrosilicate (C) Three dimensional silicate (D) Linear chain silicate

18. Which of the following complex ions is diamagnetic in nature?

(A) $[Ni(CN)_4]^{2-}$ (B) $[CuCl_4]^{2-}$ (C) $[CoF_6]^{3-}$ (D) $[NiCl_4]^{2-}$

19. Which set gives yellow ppt.?

(A) KO_3, Sb_2S_3, CdS (B) $Sb_2S_3, CdS, PbCrO_4$

(C) $PbCrO_4, As_2S_3, SnS_2$ (D) $SnS_2, As_2S_3, PbCrO_4, PbO$

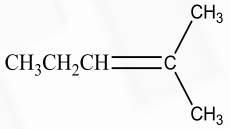
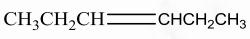
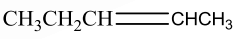
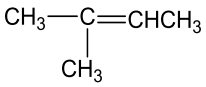
20. Which of the following pairs of metals is purified van-Arkel method?

(A) Zr & Ti (B) Ag & Au (C) Ni & Fe (D) Ga & In

21. The correct order of decreasing acidic strength of trichloroacetic acid (A), Trifluoroacetic acid (B) acetic acid (C) formic acid (D) is

(A) $B > A > D > C$ (B) $B > D > C > A$ (C) $A > B > C > D$ (D) $A > C > B > D$

22. Which alkene on ozonolysis gives CH_3CH_2CHO & $CH_3\overset{\overset{O}{\|}}{C}CH_3$?

(A)  (B)  (C)  (D) 

23. 2-bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is

(A) 2-ethoxypentane (B) pentene – 1 (C) trans-pentene -2 (D) cis-pentene-2

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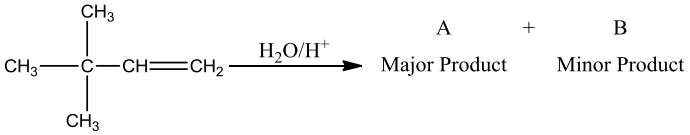
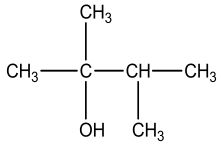
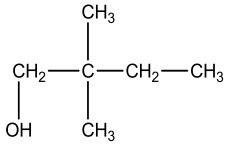
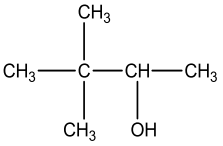
24. In the following reaction

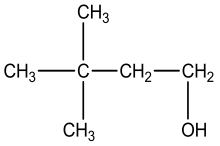


The major product A is

(A) 

(B) 

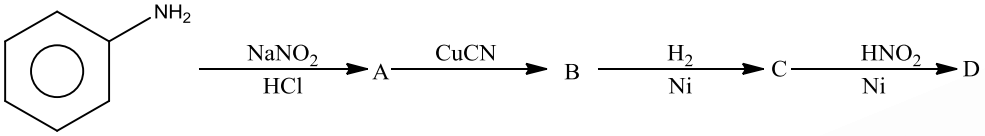
(C) 

(D) 

25. Aldol condensation will not take place in

(A) HCHO (B) CH_3CHO (C) CH_3COCH_3 (D)CH_3CH_2CHO

26. Aniline in a set of reactions yielded a product



The structure of the product D would be

(A) $C_6H_5CH_2NH_2$ (B) $C_6H_5NHCH_2CH_3$ (C) C_6H_5NHOH (D) $C_6H_5CH_2OH$

27. Number of chiral carbon atoms in $\beta-D-(+)-$ glucose is

(A) 5 (B) 6 (C)3 (D) 4

28. Nylon-66 is a polyamide obtained by the reaction of

(A) $COOH(CH_2)_4COOH + H_2NC_6H_4NH_2-(p)$ (B) $COOH(CH_2)_4COOH + NH_2(CH_2)_6NH_2$

(C) $COOH(CH_2)_6COOH + NH_2(CH_2)_4NH_2$ (D) $COOHC_6H_4COOH-(p)+NH_2(CH_2)_6NH_2$

29. Which one of the following is employed as a tranquiliser?

(A) Equanil (B) Naproxen (C) Tetracycline (D) Chlorpheninamine

30. Which one of the following statements regarding photochemical smog is not correct?

(A) Carbon monoxide does not play any role in photochemical smog formation

(B) Photochemical smog is an is an oxidizing agent in character

(C) Photochemical Smog is formed through photochemical reaction involving solar energy

(D) Photochemical smog does not cause irritation in eyes and throat

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