JEE-MAIN EXAM JANUARY, 2025

Date: - 22-01-2025 (SHIFT-1)

CHEMISTRY

SECTION-A

1.	Which of the following statement is not true for radioactive decay?										
	(1) Decay constant increases with increase in temperature.										
	(2) Half life is $\ln 2$ times	?) Half life is $\ln 2$ times of $\frac{1}{\text{rate constant}}$.									
	(3) Decay constant does	(3) Decay constant does not depend upon temperature.									
	1										
	(4) Amount of radioactive substance remained after three half lives is $\frac{1}{8}$ th of original amount.										
2.	A vessel at 1000 K cont	tains CO_2 with a press	ure of 0.5 atm . Some o	f \rm{CO}_2 is converted into CO on							
	addition of graphite. If to	otal pressure at equilibriu	um is 0.8 atm , then Kp is	3 :							
	(1) 3 atm	(2) 0.3 atm	(3) 0.18 atm	(4) 1.8 atm							
3.	The incorrect statement	s regarding geometrical	isomerism are :								
	(A) Propene shows geor	metrical isomerism.									
	(B) Trans isomer has identical atoms/groups on the opp <mark>osite sides of the dou</mark> ble bond.										
	(C) Cis-but-2-ene has higher dipole moment than trans-but-2-ene.										
	(D) 2-methylbut-2-ene shows two geometrical isomers.										
	(E) Trans-isomer has lower melting point than cis isomer.										
	Choose the correct answer from the options given below :										
	(1) (B) and (C) Only	1) (B) and (C) Only (2) (A) and (E) Only									
	(3) (A), (D) and (E) Only	1	(4) (C), (D) and (E) Onl	Dnly							
4.	A solution of aluminium chloride is electrolysed for 30 minutes using a current of 2 A . The amount of										
	aluminium deposited at	the cathode is									
	[Given : molar mass of a	aluminium and chlorine	are $27 \mathrm{gmol^{-1}}$ and 35.	$5 \mathrm{g} \mathrm{mol}^{-1}$ respectively. Faraday							
	constant = 96500 Cmol ⁻¹]										
	(1) 0.336 g	(2) 1.007 g	(3) 0.441 g	(4) 1.660 g							
5.	How many different ster	eoisomers are possible	for the given molecule?								
	$CH_3 - CH - CH = CH - CH_3$										
	OH										
	(1) 2	(2) 1	(3) 4	(4) 3							
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6.	Given below are two statements :								
	Statement I : One mole of propyne reacts with excess of sodium to liberate half a mole of $H_2^{}$ gas.								
	Statement II: Four g of propyne reacts with $NaNH_2$ to liberate NH_3 gas which occupies 224 m								
	STP.								
	In the light of the above statements, choose the most appropriate answer from the options given below :								
	(1) Both Statement I and Statement II are correct								
	(2) Statement I is correct but Statement II is incorrect								
	(3) Statement I is incorrect but Statement II is correct								
	4) Both Statement I and Statement II are incorrect								
7.	Match List-I with List-II.								
	List-I		List-II						
	(A) $Al^{3+} < Mg^{2+} < Na^+$	$< F^-$	(I) Ionisation Enthalpy						
	(B) $B < C < O < N$		(II) Metallic character						
	(C) $B < Al < Mg < K$		(III) Electronegativity						
	(D) $Si < P < S < Cl$		(IV) Ionic radii						
	Choose the correct answer from the options given below :								
	(1) (A)-(IV), (B)-(I), (C)- (I	II), (D)-(II)	(2) (A)-(IV), (B)-(<mark>I), (C)-</mark>	(II), (D)-(III)					
	(3) (A)-(III), (B)-(IV), (C)-(II), (D)-(I) (4) (A)-(II), (B)-(III), (C)- (IV), (D)-(I)								
8.	Lanthanoid ions with $4f^{7}$	configuration are :							
	(A) Eu ²⁺ (B) Gd ³⁺	(C) Eu ³⁺	(D) Tb ³⁺					
	(E) Sm ²⁺								
	Choose the correct answer from the options given below :								
	(1) (B) and (C) only (1	2) (A) and (D) only	(3) (A) and (B) only	(4) (B) and (E) only					
9.	The products formed in the following reaction sequence are :								
	NO_2 (i) Br. AcOH								
	(i) Sn_2 , ACOT								
	$\left[\bigcirc\right] \xrightarrow{(1)} A+B$ (iii) NaNO ₂ HCL 273 K								
	(iii) C_2H_5OH								
	OEt		OH OEt						
	(1) CH ₃ -COC	ЭH	$(2) \bigcup_{\mathbf{Br}} \bigcup_{\mathbf{Br}}$						
	Jr,								
	^		L						
	(3) (CH - CI	HO	(4) CH ₃ -CHO						
	Br,		Br,						
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- 10. Which of the following electrolyte can be used to obtain $H_2 S_2 O_8$ by the process of electrolysis?
 - (1) Dilute solution of sodium sulphate.
 - (2) Concentrated solution of sulphuric acid
 - (3) Acidified dilute solution of sodium sulphate.
 - (4) Dilute solution of sulphuric acid
- **11.** Given below are two statements :

Statement I: $CH_3 - O - CH_2 - Cl$ will undergo S_N^1 reaction though it is a primary halide.

Statement II :
$$CH_3 = C - CH_2 - CI$$

will not undergo S_N^2 reaction very easily though it is a primary halide. In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement I is correct but Statement II is incorrect
- (2) Both Statement I and Statement II are correct
- (3) Statement I is incorrect but Statement II is correct
- (4) Both Statement I and Statement II are incorrect
- **12.** Arrange the following solutions in order of their increasing boiling points.
 - (i) 10^{-4} MNaCl (ii) 10^{-4} M Urea (iii) 10^{-3} MNaCl (iv) 10^{-2} MNaCl
 - (1) (ii) < (i) = (iii) < (iv) (2) (iv) < (iii) < (i) < (ii) (3) (i) < (ii) < (iii) < (iv) (4) (ii) < (i) < (iv) < (iv)
- **13.** The compounds which give positive Fehling's test are :



Choose the correct answer from the options given below :

I (C) Only
2

(3) (A), (D) and (E) Only (4) (C), (D) and (E) Only

14. Which of the following electronegativity order is incorrect?

- (1) Al < Si < C < N (2) Al < Mg < B < N
- (3) S < Cl < O < F (4) Mg < Be < B < N

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- 20. In which of the following complexes the CFSE, $\Delta_{\!_{o}}$ will be equal to zero ?
 - (1) $\left[\operatorname{Fe}(\operatorname{NH}_3)_6 \right] \operatorname{Br}_2$ (2) $\operatorname{K}_3[\operatorname{Fe}(\operatorname{SCN})_6]$ (3) $\operatorname{K}_4[\operatorname{Fe}(\operatorname{CN})_6]$ (4) $\left[\operatorname{Fe}(\operatorname{en})_3 \right] \operatorname{Cl}_3$

SECTION-B

21. Some CO_2 gas was kept in a sealed container at a pressure of 1 atm and at 273 K. This entire amount of CO_2 gas was later passed through an aqueous solution of $Ca(OH)_2$. The excess unreacted $Ca(OH)_2$ was later neutralized with 0.1 M of 40 mL HCl. If the volume of the sealed container of CO_2 was *x*, then *x* is _____ cm³ (nearest integer).

[Given : The entire amount of $CO_2(g)$ reacted with exactly half the initial amount of $Ca(OH)_2$ present in the aqueous solution.]



- 22. In Carius method for estimation of halogens, 180 mg of an organic compound produced 143.5 mg of AgCl. The percentage composition of chlorine in the compound is ____%. (Given: molar mass in gmol⁻¹ of Ag:108,Cl:35.5)
- **23**. $A \rightarrow B$

The molecule A changes into its isomeric form B by following a first order kinetics at a temperature of 1000 K. If the energy barrier with respect to reactant energy for such isomeric transformation is $191.48 \text{ kJ mol}^{-1}$ and the frequency factor is 10^{20} , the time required for 50% molecules of A to become B is _____ picoseconds (nearest integer). $\left[R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}\right]$

24. The number of molecules/ions that show linear geometry among the following is

 SO_2 , $BeCl_2$, CO_2 , N_3^- , NO_2 , F_2O , XeF_2 , NO_2^+ , I_3^- , O_3

25. Consider the following sequence of reactions :

(i) Sn+HCl NO_2 (ii) NaNO2, HCl 0°C Α (iii) Cu₂Cl₂ Product (iv) Na, Ether

Molar mass of the product formed (A) is _____g mol⁻¹.

NTA ANSWERS													
1.	(1)	2.	(4)	3.	(3)	4.	(1)	5.	(3)	6.	(2)	7.	(2)
8.	(3)	9.	(3)	10.	(2)	11.	(2)	12.	(4)	13.	(4)	14.	(2)
15.	(2)	16.	(4)	17.	(3)	18.	(2)	19.	(1)	20.	(2)	21.	45
22.	20	23.	69	24.	6	25.	154						

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