

# RAMANUJAN AWARD - 1999

I.I.T. LEVEL TEST PAPER -- CHEMISTRY

Time : Three Hours

Maximum Marks : 100

- The rate of the reaction  $A(g) \rightarrow$  products is  $0.030 \text{ mol l}^{-1} \text{ min}^{-1}$  when  $[A]_0$  is  $0.150 \text{ mol l}^{-1}$ . Which of the following statement(s) is (are) correct if the reaction is first order?  
(A) a plot of  $[A]_t$  Vs time is a straight line  
(B) The rate constant of the reaction is  $0.20 \text{ min}^{-1}$   
(C) A plot of  $1/[A]_t$  Vs time is a straight line with negative slope  
(D) Time taken for 99.9% completion of the reaction is  $10 t_{1/2}$
- The order of increasing average mass per nuclear particle of the isotopes  $X = {}^{40}_{20} \text{Ca}$ ,  $Y = {}^{72}_{30} \text{Zn}$ ,  $Z = {}^{109}_{47} \text{Ag}$   
A)  $X > Y > Z$       B)  $Y > Z > X$       C)  $Z > Y > X$       D)  $Z > X > Y$
- Allyl Chloride and vinyl Chloride are distinguished by  
A)  $\text{SN}^1$  reaction      B)  $\text{SN}^2$  reaction      C) alc.  $\text{AgNO}_3$       D) aq.  $\text{AgNO}_3$
- A mixture of 3.4 mol of helium and 6.1 mol of oxygen occupies 4.75 l container at  $25^\circ \text{C}$ . Which of the following statement(s) is (are) correct  
a) He has larger average molecular speed  
b) Both helium and oxygen have equal average translational energy  
c) He gas has larger partial pressure  
d) Oxygen gas has larger mole fraction
- Ammonium dichromate decomposes to give  
A)  $\text{N}_2$       B)  $\text{O}_2$       C)  $\text{Cr}_2\text{O}_3$       D)  $\text{NO}_2$
- The Carbide(s) in which carbon is diagonally hybridised  
A)  $\text{ZrC}$       B)  $\text{Al}_4\text{C}_3$       C)  $\text{Na}_2\text{C}_2$       D)  $\text{Al}_2(\text{C})_2$
- For the system  $\text{Xe}(g) + 2 \text{F}_2(g) \rightleftharpoons \text{XeF}_4(g)$   $\Delta H = 218 \text{ kJ}$  which of the following changes would increase the equilibrium amount of  $\text{XeF}_4$   
A) Increasing the container size      B) Adding  $1^3\text{C}_2$   
C) Increasing the temperature      D) Compressing the system
- Which of the following statement(s) is (are) correct regarding  $\text{NO}_2^-$  ion  
A) Nitrogen shows  $\text{sp}^3$  hybridization      B) Contain a  $\pi$  bond and two sigma bonds  
C) Acts as an oxidizing agent      D) acts as a reducing agent