IIT-JEE-2012-P2-Model

Time:2:00 PM to 5:00 PM **IMPORTANT INSTRUCTIONS** **Max Marks: 198**

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 8)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : 9 – 14)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 15 – 20)	Questions with Multiple Correct Choice	4	0	6	24
Total				**20**	**66**

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 21 – 28)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : 29 – 34)	Questions with Comprehension Type (2 Comprehensions : 3+3 = 6Q)	3	-1	6	18
Sec – III(Q.N : 35 – 40)	Questions with Multiple Correct Choice	4	0	6	24
Total				**20**	**66**

MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : (41 – 48)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : (49 – 54)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 55 – 60)	Questions with Multiple Correct Choice	4	0	6	24
Total				**20**	**66**

CHEMISTRY: **Max. Marks: 66**

SECTION – I
(SINGLE CORRECT CHOICE TYPE)

This section contains **8 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE is correct**

21. For a real gas PV > RT at all pressure ranges, then :

A) The gas is less compressible B) The gas is highly compressible

C) The gas is not compressed at all D) The gas is liquefied easily

22. The internal pressure of one mole of a Vander waal's gas is equal to

A) zero B) b^2 C) a / V^2 D) $b - \frac{a}{RT}$

23. In a compound XY_2O_4, the oxide ions are arranged in cubic close packing arrangement and cations X are present in octahedral voids. Cations Y are equally distributed between octahedral and tetrahedral voids. The fraction of the octahedral voids occupied is

A) 1/2 B) 1/4 C) 1/6 D) 1/8

24. First three nearest neighbouring distance for body centered cubic lattice are respectively

A) $\sqrt{2}a, a, \sqrt{3}a$ B) $\frac{a}{\sqrt{2}}, a, \sqrt{3}a$ C) $\frac{\sqrt{3}a}{2}, a, \sqrt{2}a$ D) $\frac{\sqrt{3}a}{2}, a, \sqrt{3}a$

25. In which of the following reactions, there will be maximum increase in rate when the temperature is increased as given

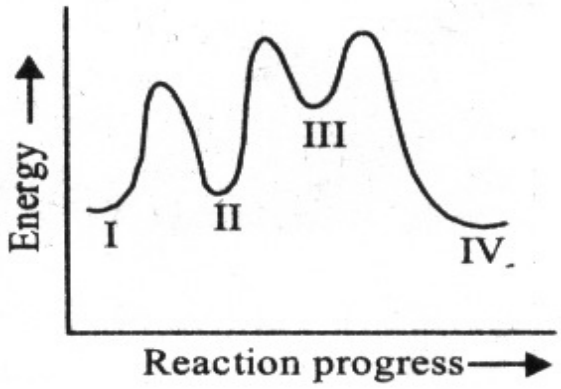
A) Reaction with $E_a = 40kJ/mol$ temperature rise = 300 to 310K

B) Reaction with $E_a = 90kJ/mol$ temperature rise = 300 to 310K

C) Reaction with $E_a = 80kJ/mol$ temperature rise = 300 to 310K

D) in all the above increase in rate is the same

26. According to the reaction profile given, which reaction step is rate determining in the forward direction?



A) I → II B) II → III C) III → II D) III → IV

27. The radioactive decay rate of a radioactive element is found to be 10^3 dps at a certain time .If the half life of element is 1 sec, the decay rate after 1 sec, is …….and after 3 sec,is…….

A) 500 dps, 125dps B) 125 dps, 500dps

C) 10^3 dps, 10^3 dps D) 100 dps, 10 dps

28. The counting rate observed from a radioactive source at t = 0 second was 1600 counts/sec and at t = 8 sec it was 100 counts/sec. The counting rate as count per sec at t = 6 sec will.

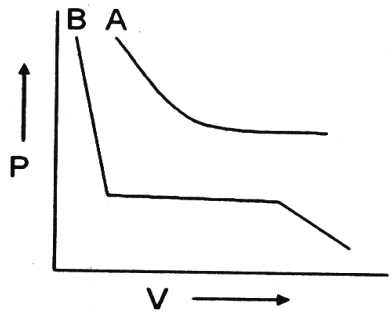
A) 400 B) 300 C) 200 D) 150

SECTION - II
(COMPREHENSION TYPE)

This section contains **6 multiple choice questions** relating to two paragraphs with three questions on each paragraph. Each question has 4 choices A), B), C) and D) for its answer, out of which **ONLY ONE is correct.**

Paragraph for Questions 29 and 30:

For two gases A and B, P Vs V isotherms are drawn at Tk as shown. T_A and T_B are critical temperatures of A and B respectively. (Critical temperature is the temperature above which a gas can't be liquefied how so ever the high pressure is applied)



29. The correct relationship among T, T_A and T_B is :

A) $T_A < T < T_B$ B) $T_A > T > T_B$ C) $T_A > T_B > T$ D) No relation

30. Which of the following statement/s is/are correct?

I) Pressure correction will be more negligible for gas B at T K

II) The curve for gas 'B' will be of same shape as for gas 'A' if $T > T_B$

III) Gas 'A' will show same P Vs. V curve as of gas B if $T > T_A$

A) All B) II and III C) II only D) III only

Paragraph for Questions 31 and 32:

KCl crystallises in the same type of lattice as does NaCl (rock salt). Given that $r_{Na^+} / r_{Cl^-} = 0.5$ and $r_{Na^+} / r_{K^+} = 0.7$

31. What is the ratio of the side of the unit cell for KCl to that for NaCl?

A) 1.143 B) 2.57 C) 2.4 D) 0.87

32. What is the ratio of density of NaCl to that of KCl?

A) 0.86 B) 1.17 C) 1.90 D) 1.143

Paragraph for Questions 33 and 34:

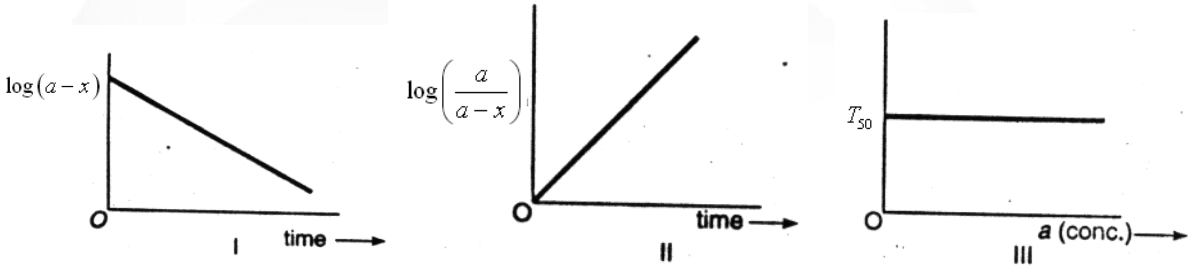
Following property is for the given order of a reaction. Based on this answer the questions given at the end of it.

Time of undergoing a definite fraction of a reactant is independent of the concentration.

33. For such reactions (as above), concentration of the reactant after two average life (also called natural life time) is reduced to ___ of its initial concentration.

A) 0.25 B) 1/e C) $1/e^2$ D) 0.75

34. Which represents above-type reaction out of I, II and III?(Here T_{50} represent halflife).



A) I, II and III B) I and III C) II and III D) only I

SECTION – III
(MULTIPLE CORRECT CHOICE TYPE)

This section contains **6 multiple choice questions.** Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE is/ are correct**

35. The correct statement regarding various types of molecular speeds are

A) increasing temperature increases the fraction of molecules having U_{mps}

B) Increasing temperature increases U_{mps}

C) In a sample of gas at a given temperature, molecules with extremely low and high speeds are less

D) At the same temperature lighter gases have narrow distribution of molecular speeds than heavier gases.

36. Which of the following is correct for critical temperature?

A) It is the highest temperature at which liquid and vapour of same substance can coexist

B) Beyond this temperature, there is no distinction between two phase and a gas cannot be liquefied by compression(pressure change).

C) At this temperature, the surface tension of the system is zero

D) At this temperature, the gas and the liquid phase have different critical densities

37. Gold has fcc structure. Choose the correct statement(s) among the following:

A) The closest distance between an impurity atom and a gold atom if the impurity atom occupies a tetrahedral hole is $\frac{\sqrt{3}a}{4}$ (a = edge length)

B) The closest distance between an impurity atom and a gold atom if the impurity atom occupies an octahedral hole is a/2

C) The impurity in octahedral hole has more nearest neighbours to interact with than the one in tetrahedral hole

D) Number of octahedral holes is more than that of tetrahedral holes

38. Select incorrect statements

A) Pre-exponential factor for zero order reaction is a unitless quantity

B) If $t_{1/4} = 30$ sec then $t_{1/2} = 60$ sec for first order reaction

C) If $t_{1/3} = 30$ sec then $t_{2/3} = 90$ sec for sec-order reaction

D) If $t_{1/5} = 30$ sec then $t_{3/5} = 90$ sec for zero order reaction

39. $A + B \rightarrow C + D$ is a stoichiometrically balanced reaction. The initial rate of the reaction is doubled if the initial concentration of A is doubled, but is quadrupled if the initial concentration of B is doubled.

Select the correct statement(s)

A) The reaction is first order in B and second order in A

B) The reaction is first order in A and second order in B

C) The reaction cannot be a single-step reaction

D) The overall order of the reaction is 3

40. Pick out the correct statement(s) from among the following :
(w.r.t. to Radio activity).

A) One gram each of radium elemental and $RaSO_4$ will have the same activity

B) The beta particle emitted by a radio active element is from valence shell of the atom.

C) Nuclear isomers will have the same mass numbers as well as atomic number.

D) The fraction decayed during 'n' half lives is $\frac{2^n - 1}{2^n}$