

Atomic masses : [H = 1, D = 2, Li = 7, C = 12, N = 14, O = 16, F = 19, Na = 23, Mg = 24, Al = 27, Si = 28, P = 31, S = 32, Cl = 35.5, K = 39, Ca = 40, Cr = 52, Mn = 55, Fe = 56, Cu = 63.5, Zn = 65, As = 75, Br = 80, Ag = 108, I = 127, Ba = 137, Hg = 200, Pb = 207]

SECTION – 1 : (Maximum Marks : 56)

- This section contains **FOURTEEN** questions
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct
- For each question, darken the bubble(s) corresponding to all the correct option(s) in the ORS
- For each question, marks will be awarded in one of the following categories :

Full Marks : +4 If only the bubble(s) corresponding to all the correct option(s) is(are) darkened.

Partial Marks : +1 For darkening a bubble corresponding to **each correct option**, provided **NO** incorrect option is darkened.

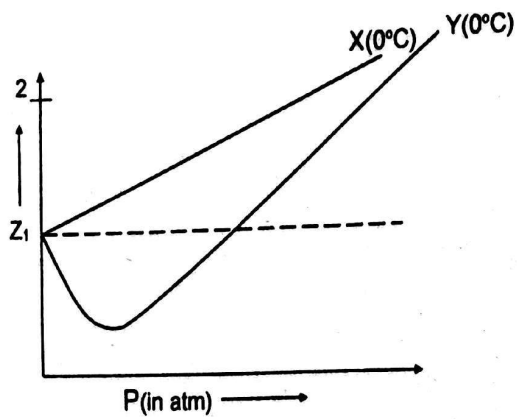
Zero Marks : 0 If none of the bubbles is darkened.

Negative Marks : -2 In all other cases.

For example, if (A), (C) and (D) are all the correct options for a question, darkening all these three will result in +4 marks ; darkening only (A) and (D) will result in +2 marks and darkening (A) and (B) will result in -2 marks, as a wrong option is also darkened.

Space for Rough Work

1. Choose incorrect statement(s) regarding gases X and Y as given in the below figure?



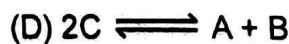
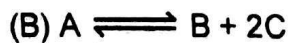
- (A) The value of van der Waals constant 'a' is higher for gas X than Y.
 (B) Both gases show positive deviation from ideal behavior at any value of pressure.
 (C) Gas Y can be easily liquefied than gas X.
 (D) Boyle temperature of gas X is higher than that of Y.
2. Which of the following reactions is/are disproportionation reactions?
- (A) $\text{Cl}_2 + \text{NaOH} \rightarrow \text{NaCl} + \text{NaClO}_3 + \text{H}_2\text{O}$ (B) $\text{NH}_4\text{NO}_2 \rightarrow \text{N}_2 + \text{H}_2\text{O}$
 (C) $\text{NH}_4\text{NO}_3 \rightarrow \text{N}_2\text{O} + \text{H}_2\text{O}$ (D) $\text{H}_3\text{PO}_3 \rightarrow \text{H}_3\text{PO}_4 + \text{PH}_3$
3. Select the correct statement(s) :
- (A) The orbital angular momentum quantum number gives information about shape of the orbital.
 (B) The magnetic quantum number gives information about the orientation of an orbital in space.
 (C) The magnetic quantum number may have values from $+\ell$ to $-\ell$
 (D) The orbital angular momentum quantum number may have values from 0 to $(n-1)$.

Space for Rough Work

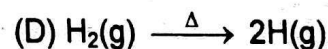
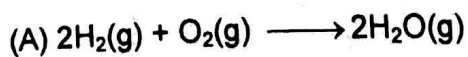
Amaneverything.weebly.com

4. A reaction at 300 K with $\Delta G^\circ = -1743 \text{ J/mol}$ consists of 3 mole of A(g), 6 mole of B(g) and 3 mole of C(g). If given A, B and C are in equilibrium in 1 litre container then the reaction may be :

[Given : $2 = e^{0.7}$, $R = 8.3 \text{ J/K - mol}$]



5. Which of the following has $\Delta S = +ve$?



6. For the given reaction



If $C_{P,A} = 20\text{J/mole-K}$ $C_{P,B} = 20\text{J/mole-K}$

Which of the following statement is/are correct?

(A) ΔH will increase on increasing temperature.

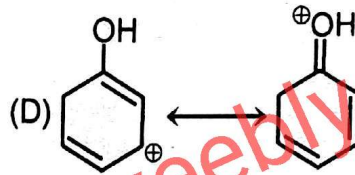
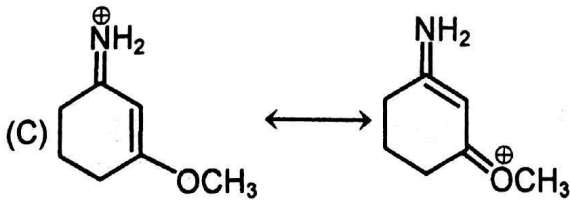
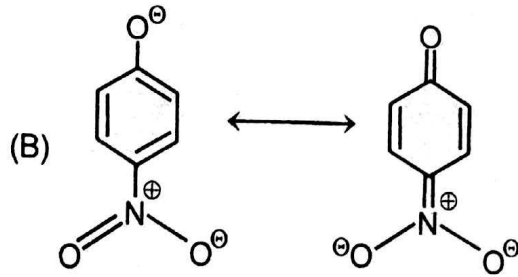
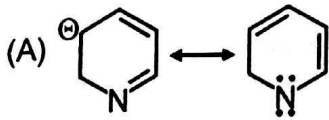
(B) ΔH will decrease on increasing temperature.

(C) At 300K, ΔG is negative.

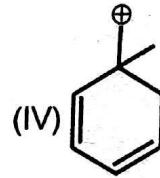
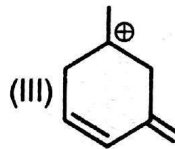
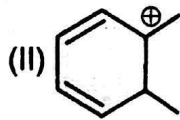
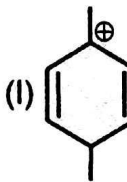
(D) At 300K, ΔG is positive.

Space for Rough Work

10. In which of the following pairs of resonating structures first resonating structure is more stable than second?



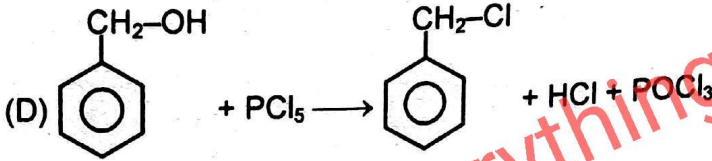
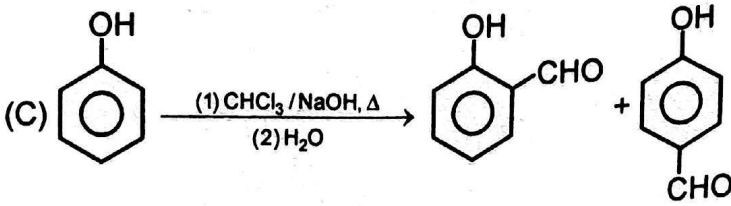
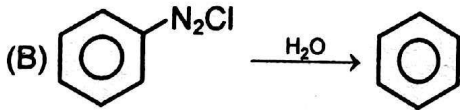
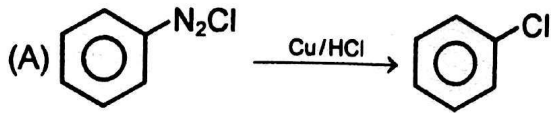
11. Choose correct statements regarding the above carbocations.




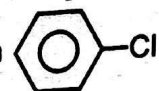
- (A) The stability order of the carbocations is II > I > III > IV
 (B) Carbocations (I) and (II) do not undergo rearrangement.
 (C) All carbon atoms of the carbocation (IV) are sp^2 -hybridised.
 (D) Carbocation (III) is stabilized through seven hyperconjugative structures.

Space for Rough Work

12. Which of the following reaction is/are correctly matched with the products :



13. A piece of red litmus paper turns white when it is dipped into a freshly made aqueous solution of the following ?
 (A) SiO_2 (B) BaO_2 (C) Na_2O_2 (D) PbO_2

14. Which of the following is/are incorrect -
 (A) In XeF_2 three lone pairs are present on central atom.
 (B) In solid PCl_5 the anion has octahedral geometry
 (C)  Clc1ccc(Cl)cc1 is more polar than  c1ccccc1Cl
 (D) Bond angle in CCl_4 is more than CF_4 .

Space for Rough Work

SECTION - 2 : (Maximum Marks : 24)

This section contains **THREE** paragraphs

Based on each paragraph, there will be **TWO** questions.

Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct

For each question, marks will be awarded in one of the following categories :

Full Marks

: +4 If only the bubble(s) corresponding to all the correct option(s) is(are) darkened.

Partial Marks

: +1 For darkening a bubble corresponding to **each correct option**, provided NO incorrect option is darkened.

Zero Marks

: 0 If none of the bubbles is darkened.

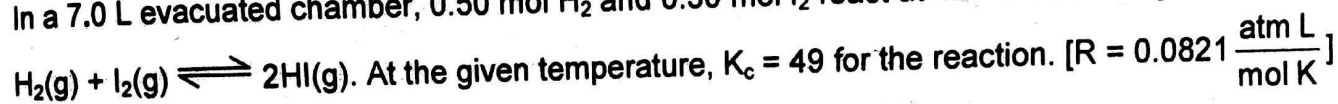
Negative Marks

: -2 In all other cases.

For example, if (A), (C) and (D) are all the correct options for a question, darkening all these three will result in +4 marks ; darkening only (A) and (D) will result in +2 marks and darkening (A) and (B) will result in -2 marks, as a wrong option is also darkened.

Paragraph for Question Nos. 15 to 16

In a 7.0 L evacuated chamber, 0.50 mol H_2 and 0.50 mol I_2 react at $427^\circ C$ according to reaction



15. Choose the correct option(s) :

(A) Value of K_p is 49.

(B) The total pressure in the chamber is 8.21 atm.

(C) At equilibrium total number of moles of mixture is 1 mol.

(D) Concentration of HI at equilibrium is $\frac{1}{9} M$

Space for Rough Work

16. The value of equilibrium constant for the above reaction varies with :
 (A) Temperature (B) Volume (C) Pressure (D) Stoichiometry of reaction

Paragraph for Question Nos. 17 to 18

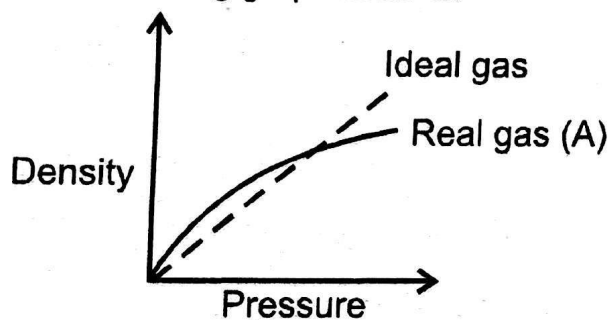
Compressibility factor (Z) ;

To study the deviation of real gas behavior from ideal gas quantitatively we introduce the compression factor, Z, the ratio of the measured molar volume of gas $V_m = V/n$, to the molar volume of an ideal gas V_m° , at the same pressure and temperature.

$$Z = \frac{V_m}{V_m^\circ}$$

Because the molar volume of a perfect gas is equal to RT/P , an equivalent expression is $Z = PV_m/RT$, which we can write as $PV_m = RTZ$

17. A gas shows following graph at 25°C:

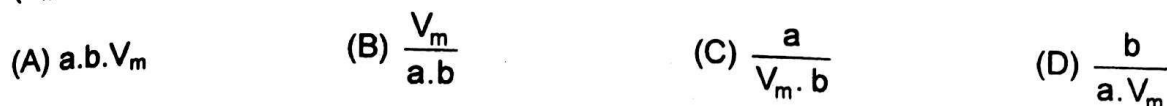


Amongs the following select correct option(s) for gas :

- (A) In the high pressure region, the gas is less compressible than ideal gas at 25°C.
 (B) Boyle temperature of gas must be more than 25°C.
 (C) Molar volume of gas is less than that of ideal molar volume at 25°C in low pressure region.
 (D) Gas shows only negative deviation throughout the graph

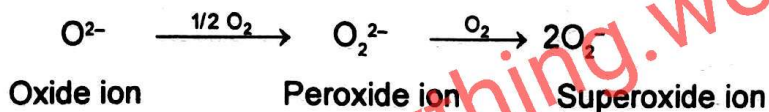
Space for Rough Work

18. For a real gas (vander Waal's gas) at Boyle's temperature and low pressure, the pressure may be ($V_m \Rightarrow$ molar volume) :



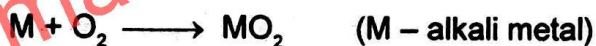
Paragraph for Question Nos. 19 to 20

Lithium only forms monoxide when heated in oxygen. Sodium forms monoxide and peroxide in excess of oxygen. Other alkali metals form superoxide with oxygen i.e. MO_2 . The abnormal behavior of Lithium is due to small size. The larger size of alkali metals has tendency to form superoxides. The three ions are related to each other as follows –



All the three ions abstract proton from water.

19. Consider the following reaction



Select the correct statement/s :

- (A) M will not be Li (B) M will not be Na
(C) M will not be Rb (D) M will not be K

20. Which compound will liberate oxygen when reacted with water :



Space for Rough Work