ANANDALAYA
PERIODIC TEST-3
Class: XI

विद्या सर्वार्थि साधिका

Subject: Chemistry M M : 40
Date:04-02-2022 Time: 1Hr. 30 min.

General Instructions:
Read the following instructions carefully.
a) There are 20 questions in this question paper. All questions are compulsory.
b) Section A: Q. No. 1 to 10 are objective type questions of one mark each.
c) Section B: Q. No. 11 to 14 are short answer questions and carry 2 marks each.
d) Section C: Q. No. 15 to 18 are short answer questions and carry 3 marks each.
e) Section D: Q. No. 19 to 20 are short answer questions and carry 5 marks each.
f) Use of calculators and log tables is not permitted.

SECTION A

1 Out of NH_3 and N_2, which will have (i) larger value of 'a' and (ii) larger value of 'b' (1)

2 Under what conditions do real gases tend to show ideal gas behaviour? (1)

3 How is the partial pressure of a gas in a mixture related to the total pressure of the gaseous mixture? (1)

4 In a process, 701 J of heat is absorbed by a system and 394 J of work is done by the system. What is the change in internal energy for the process? (1)

5 White fumes appear around the bottle of anhydrous aluminium chloride. Give reason (1)

6 What is the state of hybridisation of carbon in (a) CO_3^{2-} (b) graphite? (1)

7 The E^0 for Cl_2/Cl^- is +1.36, for I_2/I^- is + 0.53, for Ag^+ /Ag is +0.79, Na^+ /Na is –2.71 and for Li^+ /Li is – 3.04. Arrange the following ionic species in decreasing order of reducing strength: I^-, Ag, Cl^-, Li, Na (1)

8 Why is KO_2 paramagnetic? (1)

9 The reducing power of a metal **depends** on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution. (1)
(a) Sublimation enthalpy (b) Ionisation enthalpy
(c) Hydration enthalpy (d) Electron-gain enthalpy

10 **Assertion (A)**: Three states of matter are the result of balance between intermolecular forces and thermal energy of the molecules. . (1)
Reason (R): Intermolecular forces tend to keep the molecules together but thermal energy of molecules tends to keep them apart.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

SECTION B

11 What will be the pressure of the gas mixture when 0.5 L of H_2 at 0.8 bar and 2.0 L of dioxygen at 0.7 bar are introduced in a vessel at 27 °C? (2)

OR

Calculate the total pressure in a mixture of 8g of oxygen and 4g of hydrogen confined in a vessel of l dm^3 at 27°C. R = 0.083 bar dm^3 K^{-1} mol^{-1}.

12 Enthalpy of combustion of carbon to carbon dioxide is – 393.5 J $mol^{-1.}$ Calculate the heat released upon formation of 35.2 g of $C0_2$ from carbon and oxygen gas. (2)

13 How can you explain higher stability of BCl_3 as compared to $TlCl_3$? (2)

14 Hydrogen gas, a potential fuel, can be made by the reaction of methane gas and steam: (2)

$$CH_4(g) + 2\ H_2O(g) \rightarrow 4\ H_2(g) + CO_2(g)$$

Use bond energies to calculate ΔHrxn for this reaction.

(Bond energy of C- H = 414 kJ, O - H = 464 kJ , H – H = 436 kJ, C = O = 799 kJ)

SECTION C

15 Compare the alkali metals and alkaline earth metals with respect to; (3)
(i) ionisation enthalpy (ii) basicity of oxides and (iii) solubility of hydroxides

16 Give reasons for the following: (3)
(i) Cone. HNO_3 can be transported in aluminium container.
(ii) A mixture of dilute NaOH and aluminium pieces is used to open drain.
(iii) Graphite is used as lubricant.

17 Why are $BeSO_4$ and $MgS0_4$ readily soluble in water while $CaS0_4$, $SrSO_4$ and $BaSO_4$ are insoluble? (3)

18 (3)

Find ΔH_{rxn} for the reaction:

$$3\ C(s) + 4\ H_2(g) \longrightarrow C_3H_8(g)$$

Use these reactions with known ΔH's:

$$C_3H_8(g) + 5\ O_2(g) \longrightarrow 3\ CO_2(g) + 4\ H_2O(g) \qquad \Delta H = -2043\ kJ$$

$$C(s) + O_2(g) \longrightarrow CO_2(g) \qquad \Delta H = -393.5\ kJ$$

$$2\ H_2(g) + O_2(g) \longrightarrow 2\ H_2O(g) \qquad \Delta H = -483.6\ kJ$$

SECTION D

19 (5)
(a) How does the density of a gas depend on: (i) temperature (ii) Pressure? How does it depend on the molar mass of the gas?
(b) Derive the relation PV=nRT where R is a constant called universal gas constant**.**
(c) What is the relationship between the partial pressures of each gas in a sample and the total pressure of gas in the sample?

20 A 1.00-L mixture of helium, neon, and argon has a total pressure of 662 mmHg at 298 K. If the partial pressure of helium is 341 mmHg and the partial pressure of neon is 112 mmHg, what mass of argon is present in the mixture? (5)

OR

A 12.5-L scuba diving tank contains a helium-oxygen (heliox) mixture of 24.2 g of He and 4.32 g of O_2 at 298 K. Calculate the mole fraction and partial pressure of each component in the mixture and the total pressure of the mixture.