1. A gaseous compound of nitrogen and hydrogen contains 12.5% (by mass) of Hydrogen. The density of the compound relative to hydrogen is 16. The molecular formula of the compound is :
(1) NH2
(2) NH3
(3) N3H
(4) N2H4
Solution:
Given that the gaseous compound of nitrogen and hydrogen contains 12.5% (by mass) of Hydrogen.

Element	Percentage	Atomic ratio	Simple ratio
H	12.5%	12.5/1 = 12.5	12.5/6.25 = 2
N	87.5%	87.5/14 = 6.25	6.25 / 6.25 = 1

Empirical formula = NH2
Empirical mass = 16
Molecular weight = 2× Vapour density = 2×16 = 32
So n = molecular mass / empirical mass = 32/16 = 2
Molecular formula = Empirical formula × n
= (NH2)×2
= N2H4
Hence option (4) is the answer.

2. The one that is extensively used as a piezoelectric material is
(1) quartz
(2) amorphous silica
(3) tridymite
(4) mica
Solution:
Quartz is used as a piezoelectric material.
Hence option (1) is the answer.

3. Which primitive unit cell has unequal edge lengths and all axial lengths different from 900?
(1) Monoclinic
(2) Triclinic
(3) Tetragonal
(4) Hexagonal
Solution:
The triclinic primitive unit cell has unequal edge lengths and all axial lengths different from 900.
Hence option (2) is the answer.

4. In Van der Waals equation of state of the gas law, the constant b is a measure of

(1) Intermolecular repulsions

(2) Intermolecular attraction

(3) Volume occupied by molecules

(4) Intermolecular collisions per unit volume.

Solution:

Van der Waals constant b is the measure of the effective volume occupied by the gas molecules.

Hence option (3) is the answer.

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5. A pressure cooker reduces cooking time for food because

(1) Heat is more evenly distributed in the cooking space.

(2) B.P of water involved in cooking is increased

(3) The higher pressure inside the cooker crushes the food.

(4) Cooking involves chemical changes helped by a rise in temperature.

Solution:

By Gay Lussac's law, at constant pressure of a given mass of a gas is directly proportional to the absolute temperature of the gas. So on increasing pressure, temperature also increases. So the boiling point of water is also increased.

Hence option (2) is the answer.

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6. According to the kinetic theory of gases, in an ideal gas, between two successive collisions a gas molecule travels

(1) In a circular path

(2) In wavy path

(3) In a straight line path

(4) with an accelerated velocity

Solution:

According to the kinetic theory of gases, in an ideal gas, between two successive collisions a gas molecule travels in a straight line path.

Hence option (3) is the answer.