Nature of Matter: Elements, Compounds, and Mixtures

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. A substance that cannot be broken down into simpler substances is an:
(a) mixture **(b)** alloy **(c)** compound **(d)** element

2. What kind of substance is water?
(a) neither, it is not matter **(b)** a form of energy
(c) compound **(d)** mixture

3. Which of these is a MIXTURE?
(a) iron sulfide **(b)** mercury **(c)** oxygen **(d)** poha

4. Which of these is a COMPOUND?
(a) carbon dioxide **(b)** hydrogen **(c)** sea water **(d)** sulfur

5. Bronze is a mixture of:
(a) copper and zinc **(b)** copper and iron only
(c) copper and tin **(d)** gold and silver

6. Air is about 78% nitrogen. About how many litres of nitrogen are in 1,000 L of air?
(a) 1,000 L **(b)** 220 L **(c)** 780 L **(d)** 210 L

7. Each particle of water has 2 hydrogen atoms and 1 oxygen atom. How many hydrogen atoms are there in 2 water particles?
(a) 4 atoms **(b)** 8 atoms **(c)** 2 atoms **(d)** 6 atoms

8. Bronze (Kamsya) has 4 parts copper to 1 part tin. How much copper is in 700 g of this bronze?
(a) 700 g **(b)** 175 g **(c)** 140 g **(d)** 560 g

Section B — Short answer — 8 × 2 = 16 marks

9. What is the difference between an element and a compound?

10. Is each an "element", a "compound" or a "mixture"? (a) sulfur (b) brass

11. Is each a "metal", "non-metal" or "metalloid"? (a) silicon (b) carbon

12. What kind of mixture is each (for example gas in liquid)? (a) sand and water (b) oil and water

13. A mixture is made from 5.6 g of iron and 3.2 g of sulfur. If 14 times as much of each is used, what is the total mass of the mixture?

14. How many atoms in all (hydrogen and oxygen) are there in 21 particles of water?

15. If air is about 21% oxygen, how many litres of oxygen are in 3,000 L of air?

16. Name the gas that (a) smells of rotten eggs (from iron sulfide and acid) (b) turns lime water milky

Section C — Word problems — 4 × 4 = 16 marks

17. Compare a mixture of iron and sulfur with the compound iron sulfide.

18. Classify as element, compound or mixture: poha, gold, water, air, iron, stainless steel. Which of these are pure substances in science?

19. 67.2 g of iron filings and 38.4 g of sulfur powder are mixed (A); another identical lot is heated strongly to form iron sulfide (B). (a) What is the mass of each lot? (b) Give two tests that tell A and B apart. (c) Which is a compound?

20. A room holds 1,800 L of air. (a) About how much is nitrogen (78%)? (b) Is air an element, compound or mixture? (c) Give two reasons for your answer.

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Answer key

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Q	Answer	Working
1	**(d) element**	—
2	**(c) compound**	—
3	**(d) poha**	—
4	**(a) carbon dioxide**	—
5	**(c) copper and tin**	—
6	**(c) 780 L**	78 × 1000 ÷ 100
7	**(a) 4 atoms**	2 × 2 = 4
8	**(d) 560 g**	4/5 of 700 = 560
9	**An element has only one kind of atom and cannot be broken down; a compound has elements combined in a fixed ratio.**	—
10	**(a) element (b) mixture**	—
11	**(a) metalloid (b) non-metal**	—
12	**(a) solid in liquid (b) liquid in liquid**	—
13	**123.2 g**	(5.6 + 3.2) × 14
14	**63 atoms**	3 × 21
15	**630 L**	21 × 3000 ÷ 100
16	**(a) hydrogen sulfide (b) carbon dioxide**	—
17	**In the mixture, iron is attracted by a magnet and can be separated; with dilute acid it gives hydrogen, which burns with a pop. Iron sulfide is black, not magnetic, cannot be separated by a magnet, and with acid gives a gas that smells of rotten eggs.**	—
18	**poha: mixture; gold: element; water: compound; air: mixture; iron: element; stainless steel: mixture. Pure substances: the elements and compounds.**	—
19	**(a) 105.6 g each (b) A magnet pulls iron out of A but not B; with dilute acid A gives hydrogen (pops) while B gives a gas smelling of rotten eggs. (c) B, iron sulfide.**	—

Q	Answer	Working
20	**(a) About 1,404 L (b) A mixture (c) Its gases keep their own properties, and they are not in a fixed ratio (they can be separated by physical methods).**	—