Laws of chemical combination

1. **Which pair illustrates the law of multiple proportions?**
   - **Answer:** (a) CO and CO_2
   - **Reasoning:** Carbon combines with oxygen in different ratios (1:1 in CO, 1:2 in CO_2) showing multiple proportions.
2. **1.0 g of an oxide of A contains 0.5 g of A; 4.0 g of another oxide contains 1.6 g of A. Law indicated?**
   - **Answer:** (d) Multiple proportions
   - **Reasoning:** The ratio of element A in two compounds is simple whole numbers → law of multiple proportions.
3. **Pair illustrating law of multiple proportions**
   - **Answer:** (a) NH_3 and NCl_3
   - **Reasoning:** Nitrogen combines with hydrogen and chlorine in small whole number ratios.
4. **Copper percentage in CuO same by different methods illustrates**
   - **Answer:** (a) Constant proportions
   - **Reasoning:** Composition of a compound is fixed irrespective of source.
5. **Two samples of lead oxide reduced to lead: weight ratio 1:2. Illustrates**
   - **Answer:** (c) Law of multiple proportions
   - **Reasoning:** Different oxides of same element combine in simple whole number ratios.
6. **Chemical equation balanced according to**
   - **Answer:** (c) Conservation of mass
   - **Reasoning:** Mass of reactants = mass of products.
7. **Avogadro number**
   - **Answer:** (c) Number of molecules present in one gram molecular mass of a substance
   - **Reasoning:** Avogadro number = number of particles in 1 mole.
8. **Different proportions of oxygen in oxides of nitrogen**
   - **Answer:** (b) Multiple proportion
   - **Reasoning:** Same element forms compounds with oxygen in small whole number ratios.

9. **Two elements X (14) and Y (16) form series A-E, same ratio 1:2:3:4:5. If A has 28 g X and 16 g Y, C has:**
   - **Answer:** (b) 48 g Y
   - **Reasoning:** Simple ratio scaling: 1 → 16 g, 3 → 48 g.
10. **Carbon and oxygen form CO and CO_2 (12:16 and 12:32)**
   - **Answer:** (a) Law of multiple proportions
   - **Reasoning:** Oxygen combines with carbon in simple whole number ratios.
11. **Ca in 4 g $CaCO_3$ if composition is Ca 40%**
   - **Answer:** (c) 1.6 g
   - **Reasoning:** 40% of 4 g = 1.6 g.
12. **n g X reacts with m g Y to form p g R + q g S**
   - **Answer:** (b) n + m = p + q
   - **Reasoning:** Law of conservation of mass.
13. **Best example of conservation of mass**
   - **Answer:** (a) 12 g C + 32 g O → 44 g CO_2
   - **Reasoning:** Mass of reactants = mass of products.
14. **Law of multiple proportions illustrated by**
   - **Answer:** (d) SO_2 and SO_3
   - **Reasoning:** Sulfur combines with oxygen in 2:3 ratio.
15. **Compounds A, B, C with N:O ratios 1.00:0.57, 2.00:2.24, 3.00:5.11 obey**
   - **Answer:** (b) Law of multiple proportion
   - **Reasoning:** Ratios of oxygen to nitrogen in different compounds are simple multiples.
16. **H combines with O → H_2O (2:16) and C → CH_4 (2:6). If C and O combine:**
   - **Answer:** (a) 6:16 or 12:32
   - **Reasoning:** Maintaining proportionality for multiple compounds.

17. (c) Reciprocal proportions

Reason:

According to the **law of reciprocal proportions**, if element A combines with element B and also with element C, then the ratio of the masses of B and C which combine with a fixed mass of A is either the same or a simple multiple ratio.

Here, hydrogen combines with both oxygen and carbon, and the mass ratios of carbon and oxygen also match in carbon dioxide — illustrating the law of reciprocal proportions.

18. Element forms oxides with 53.33% and 36.36% O

1. **Answer:** (d) Multiple proportions
2. **Reasoning:** Simple whole number ratio between amounts of oxygen in oxides.

19. After chemical reaction, total mass

1. **Answer:** (c) Not changed
2. **Reasoning:** Law of conservation of mass.

20. Pure CO2 contains 27.27% C and 72.73% O

1. **Answer:** (a) Law of constant composition
2. **Reasoning:** Composition of compound fixed irrespective of source.

21. Law of definite proportions not applicable to nitrogen oxide because

1. **Answer:** (c) Nitrogen equivalent weight is variable
2. **Reasoning:** Nitrogen forms multiple oxides with variable ratios.

22. Pair illustrating law of multiple proportion

1. **Answer:** (d) $SnCl_2$, $SnCl_4$
2. **Reasoning:** Tin combines with chlorine in ratios 2:4, a simple whole number ratio.