

Relating the Mole and the Volume of Gas

- Which of the following statements about one mole of a substance is true?
A One mole of neon contains 6.02×10^{23} atoms.
B One mole of sodium chloride contains 1.81×10^{24} ions.
C One mole of calcium has the same mass as one mole of magnesium.
D One mole of oxygen gas occupies 12 dm^3 at r.t.p. ()
- Which quantity is the same for one mole of nitrogen gas and one mole of carbon dioxide gas?
A Volume at r.t.p. C Mass
B Number of atoms D Protons in the nucleus ()
- One mole of ammonia, NH_3 , and one mole of methane, CH_4 , have _____.
A the same mass
B the same number of molecules
C the same number of atoms
D the same reactivity ()
- One mole of hydrated zinc chloride, $\text{ZnCl}_2 \cdot 4\text{H}_2\text{O}$, is dissolved in water. How many moles of ions does the solution contain?
A 1 C 3
B 2 D 7 ()
- Which of the following contains 6.02×10^{23} atoms?
A One mole of nitrogen gas C One mole of carbon dioxide
B One mole of argon gas D One mole of iodine solid ()
- How many molecules are there in one mole of carbon dioxide?
A 3.0×10^{23} molecules C 1.8×10^{23} molecules
B 6.0×10^{23} molecules D 2.4×10^{23} molecules ()
- A balloon contains 6.0×10^{22} helium atoms. What is the number of moles of helium in the balloon?
A 0.1 mol C 0.2 mol
B 1.0 mol D 2 mol ()
- Calculate the mass of carbon dioxide which contains 6.0×10^{22} molecules at r.t.p..
A 0.04 g C 4.40 g
B 0.44 g D 44.0 g ()
- A nitrogen gas at r.t.p. has a mass of 10 g. What is the mass of carbon monoxide of the same volume at r.t.p.?
A 5 g C 15 g
B 10 g D 20 g ()
- Which of the following element contains the greatest number of atoms in 1 g?
A Lithium C Copper
B Carbon D Oxygen ()

Adapted:

Upper Secondary Chemistry Tutorial

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Answers to

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1. **A** One mole of sodium chloride contains 2 moles (1.204×10^{24}) of ions. The mass of one mole of substance is its molecular mass. Hence, one mole of calcium cannot be the same mass as one mole of magnesium. One mole of any gas occupies 24 dm³ at r.t.p.
2. **A**
3. **B** One mole of ammonia and one mole of methane have 6.02×10^{23} molecules.
4. **C** When dissolved in water, one mole of hydrated zinc chloride, $\text{ZnCl}_2 \cdot 4\text{H}_2\text{O}$ will produce one mole of Zn^{2+} and 2 moles of Cl^- .
5. **B** Argon is made up of atoms while the rest are made up of molecules.
6. **B**
7. **A** One mole of helium contains 6.0×10^{23} helium atoms. Hence 0.1 mole of helium contains 6.0×10^{22} atoms.
8. **C** The mass of 0.1 mole of carbon dioxide is 0.1×44 g.
9. **B** The number of moles of nitrogen is $\frac{10}{28}$ mol.
The same amount of carbon monoxide will weigh $\frac{10}{28} \times 28$ (M_r of CO).
10. **A**

$$\text{Number of moles (Li)} = \frac{1}{7} \text{ mol}$$

$$\text{Number of moles (C)} = \frac{1}{12} \text{ mol}$$

$$\text{Number of moles (Cu)} = \frac{1}{64} \text{ mol}$$

$$\text{Number of moles (O)} = \frac{1}{16} \text{ mol}$$

So lithium contains the greatest number of atoms.