

Chemical Reactions

Name - _____

1.) Give an example of a system which is closed with respect to light.

Answer - opaque box.

2.) Give an example of a system which is open with respect to light but closed in respect to mass.

Answer - transparent box.

3.) You rip a piece of paper into several pieces.

a.) What is conserved with respect to the paper?

Answer - composition, total mass, colour, volume and density.

b.) What is not conserved with respect to the paper?

Answer - number of pieces and shape.

c.) One piece of paper is taken away. What is conserved now?

Answer - colour and density.

d.) One piece of paper is taken away. What is **NOT** conserved now?

Answer - volume, shape and the number of pieces.

4.) Which conservation laws, if any, are being broken in the following situations?

a.) $\text{Fe} + \text{S} \rightarrow \text{CuS}$

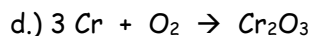
Answer - Law of conservation of mass and atoms.

b.) 7.0 g of nitrogen are reacted with 8.0 g of oxygen to make 16.0 g of nitrogen monoxide.

Answer - Law of conservation of mass.

c.) $2 \text{Ag}^+ + \text{SO}_4^{2-} \rightarrow \text{Ag}_2\text{SO}_4$

Answer - none



Answer - Law of conservation of mass and atoms.

e.) 71.0 g of chlorine gas and 64.0 g of oxygen gas produce 135 g of chlorine dioxide gas.

Answer - none.

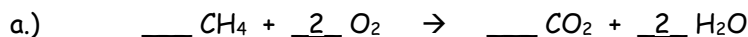
5.) Which of the following are conserved in a chemical reaction?

a.) phase

b.) number of atoms

c.) volume

6.) Do the following reactions obey the laws of conservation of atoms and mass? Explain.

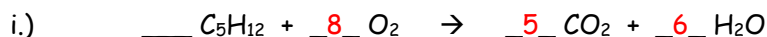
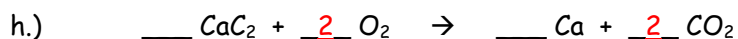
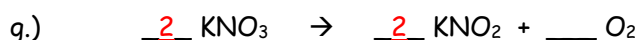
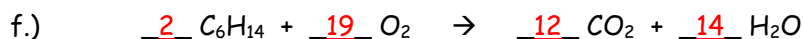
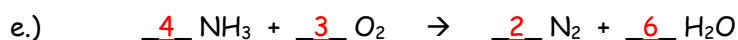
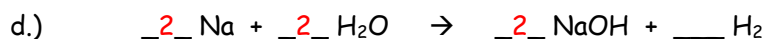


Answer - yes, the total number and kinds of atoms are equal on both sides. Therefore mass must be equal as well.

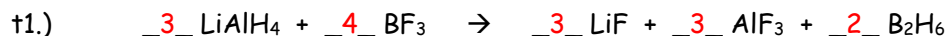
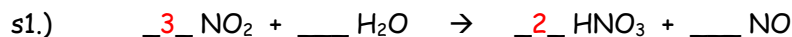
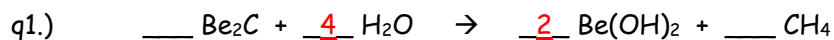
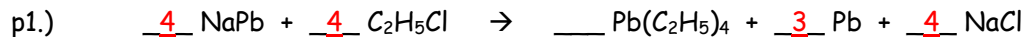
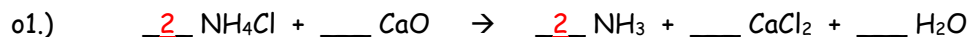
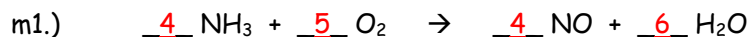
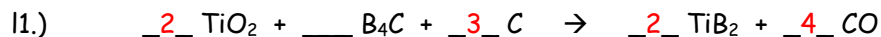
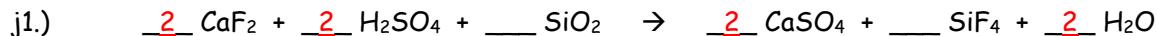
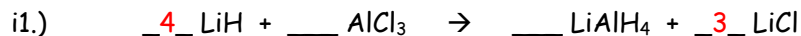


Answer - yes, the total number and kinds of atoms are equal on both sides. Therefore mass must be equal as well.

7.) Balance the following chemical equations:



- k.) $\underline{2}$ KOH + $\underline{\quad}$ H₂SO₄ → $\underline{\quad}$ K₂SO₄ + $\underline{2}$ H₂O
- l.) $\underline{\quad}$ Ca(OH)₂ + $\underline{2}$ NH₄Cl → $\underline{2}$ NH₃ + $\underline{\quad}$ CaCl₂ + $\underline{2}$ H₂O
- m.) $\underline{5}$ C + $\underline{2}$ SO₂ → $\underline{\quad}$ CS₂ + $\underline{4}$ CO
- n.) $\underline{\quad}$ Mg₃N₂ + $\underline{6}$ H₂O → $\underline{3}$ Mg(OH)₂ + $\underline{2}$ NH₃
- o.) $\underline{\quad}$ V₂O₅ + $\underline{5}$ Ca → $\underline{5}$ CaO + $\underline{2}$ V
- p.) $\underline{\quad}$ Na₂O₅ + $\underline{\quad}$ H₂O → $\underline{2}$ NaOH + $\underline{2}$ O₂
- q.) $\underline{\quad}$ Fe₃O₄ + $\underline{4}$ H₂ → $\underline{3}$ Fe + $\underline{4}$ H₂O
- r.) $\underline{\quad}$ Cu + $\underline{2}$ H₂SO₄ → $\underline{\quad}$ CuSO₄ + $\underline{2}$ H₂O + $\underline{\quad}$ SO₂
- s.) $\underline{2}$ Al + $\underline{3}$ H₂SO₄ → $\underline{3}$ H₂ + $\underline{\quad}$ Al₂(SO₄)₃
- t.) $\underline{2}$ Si₄H₁₀ + $\underline{13}$ O₂ → $\underline{8}$ SiO₂ + $\underline{10}$ H₂O
- u.) $\underline{4}$ NH₃ + $\underline{\quad}$ O₂ → $\underline{2}$ N₂H₄ + $\underline{2}$ H₂O
- v.) $\underline{2}$ C₁₅H₃₀ + $\underline{45}$ O₂ → $\underline{30}$ CO₂ + $\underline{30}$ H₂O
- w.) $\underline{2}$ BN + $\underline{3}$ F₂ → $\underline{\quad}$ N₂ + $\underline{2}$ BF₃
- x.) $\underline{\quad}$ CaSO₄·2H₂O + $\underline{2}$ SO₃ → $\underline{\quad}$ CaSO₄ + $\underline{2}$ H₂SO₄
- y.) $\underline{4}$ C₃H₇N₂O₇ + $\underline{5}$ O₂ → $\underline{12}$ CO₂ + $\underline{14}$ H₂O + $\underline{4}$ N₂
- z.) $\underline{\quad}$ C₇H₁₆O₄S₂ + $\underline{11}$ O₂ → $\underline{7}$ CO₂ + $\underline{8}$ H₂O + $\underline{2}$ SO₂
- a1.) $\underline{9}$ Na + $\underline{4}$ ZnI₂ → $\underline{8}$ NaI + $\underline{\quad}$ NaZn₄
- b1.) $\underline{\quad}$ HBrO₃ + $\underline{5}$ HBr → $\underline{3}$ Br₂ + $\underline{3}$ H₂O
- c1.) $\underline{\quad}$ Al₄C₃ + $\underline{12}$ H₂O → $\underline{4}$ Al(OH)₃ + $\underline{3}$ CH₄
- d1.) $\underline{2}$ Ca(NO₃)₂·3H₂O + $\underline{3}$ LaC₂ → $\underline{2}$ Ca(NO₃)₂ + $\underline{3}$ La(OH)₂ + $\underline{3}$ C₂H₂
- e1.) $\underline{\quad}$ CH₃NO₂ + $\underline{3}$ Cl₂ → $\underline{\quad}$ CCl₃NO₂ + $\underline{3}$ HCl
- f1.) $\underline{\quad}$ Ca₃(PO₄)₂ + $\underline{3}$ SiO₂ + $\underline{5}$ C → $\underline{3}$ CaSiO₃ + $\underline{5}$ CO + $\underline{2}$ P
- g1.) $\underline{\quad}$ Al₂C₆ + $\underline{6}$ H₂O → $\underline{2}$ Al(OH)₃ + $\underline{3}$ C₂H₂



Optional - The tough ones that **A** students should try.

