

Answers

1.

a)	i, CaI_2 , 293.88 g/mol	b)	i, calcium carbonate, 100.09 g/mol
c)	i, $\text{Al}(\text{NO}_2)_3$, 165.01 g/mol	d)	i, magnesium hydroxide, 58.33 g/mol
e)	m, $\text{C}_2\text{H}_5\text{OH}$, 46.08 g/mol	f)	m, sucrose, 342.34 g/mol
g)	m, CH_3OH , 32.05 g/mol	h)	m, carbon tetrachloride, 153.81 g/mol
i)	m, CS_2 , 76.15 g/mol	j)	i, strontium carbonate, 147.63 g/mol
k)	m, P_2O_7 , 266.85 g/mol	l)	i, copper (II) sulfate trihydrate, 213.67 g/mol
m)	i, FeCl_2 , 126.75 g/mol	n)	i, lead (II) iodide, 460.99 g/mol
o)	i, PbO_2 , 239.19 g/mol	p)	a, acetic acid, 60.06 g/mol
q)	a, H_2SO_3 , 82.08 g/mol	r)	m, methanol, 32.05 g/mol
s)	m, NH_3 , 17.04 g/mol	t)	i, sodium iodate, 197.89 g/mol
u)	i, $(\text{NH}_4)_3\text{PO}_4$, 149.12 g/mol	v)	i, calcium nitride, 148.26 g/mol
w)	i, $\text{Ba}(\text{IO}_3)_2$, 487.13 g/mol	x)	m, carbon disulfide, 76.13 g/mol
y)	m, ammonia, 17.04 g/mol		

2.

- a) simple decomposition

$$8 \text{Al}_2(\text{SO}_4)_3(\text{s}) \rightarrow 16 \text{Al}(\text{s}) + 3 \text{S}_8(\text{s}) + 48 \text{O}_2(\text{g})$$
 aluminum sulfate aluminum sulfur oxygen
- b) hydrocarbon combustion

$$\text{C}_2\text{H}_5\text{OH}(\text{l}) + 3 \text{O}_2(\text{g}) \rightarrow 2 \text{CO}_2(\text{g}) + 3 \text{H}_2\text{O}(\text{g})$$
 ethanol oxygen carbon dioxide water
- c) double replacement

$$\text{H}_2\text{SO}_4(\text{aq}) + 2 \text{KOH}(\text{aq}) \rightarrow 2 \text{HOH}(\text{l}) + \text{K}_2\text{SO}_4(\text{aq})$$
 sulfuric acid potassium hydroxide water potassium sulfate
- d) double replacement

$$\text{Na}_2\text{CO}_3(\text{e}) + 2 \text{CH}_3\text{COOH}(\text{aq}) \rightarrow \text{H}_2\text{CO}_3(\text{aq}) + 2 \text{NaCH}_3\text{COO}(\text{aq})$$
 sodium carbonate acetic acid carbonic acid sodium acetate
- e) double replacement

$$2 \text{AlPO}_4(\text{aq}) + 3 \text{Mg}(\text{OH})_2(\text{aq}) \rightarrow \text{Mg}_3(\text{PO}_4)_2(\text{s}) + 2 \text{Al}(\text{OH})_3(\text{s})$$
 aluminum phosphate magnesium hydroxide magnesium phosphate aluminum hydroxide
- f) simple composition

$$\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightarrow 2 \text{NH}_3(\text{g})$$
 nitrogen hydrogen ammonia
- g) single replacement

$$2 \text{NaI}(\text{aq}) + \text{Cl}_2(\text{aq}) \rightarrow 2 \text{NaCl}(\text{aq}) + \text{I}_2(\text{aq})$$
 sodium iodide chlorine sodium chloride iodine
- h) double replacement

$$2 \text{KI}(\text{aq}) + \text{Pb}(\text{NO}_3)_2(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2 \text{KNO}_3(\text{aq})$$
 potassium iodide lead (II) nitrate lead (II) iodide potassium nitrate
- i) other

$$2 \text{C}_8\text{H}_{18}(\text{l}) + 21 \text{O}_2(\text{g}) \rightarrow 8 \text{CO}(\text{g}) + 8 \text{CO}_2(\text{g}) + 18 \text{H}_2\text{O}(\text{l})$$
 octane oxygen carbon monoxide carbon dioxide water
- j) simple decomposition

$$4 \text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}(\text{s}) \rightarrow 4 \text{Fe}(\text{s}) + \text{S}_8(\text{s}) + 28 \text{O}_2(\text{g}) + 4 \text{N}_2(\text{g}) + 40 \text{H}_2(\text{g})$$
 iron (II) sulfate ammonium sulfate hexahydrate iron sulfur oxygen nitrogen hydrogen

- 3.
- | | | | | | |
|----|---|---------------|-------------------------------|-----|---------------------------------|
| a) | $\text{Al}_2(\text{SO}_4)_3(\text{aq})$ | \rightarrow | $2 \text{Al}^{3+}(\text{aq})$ | $+$ | $3 \text{SO}_4^{2-}(\text{aq})$ |
| b) | $\text{Na}_2\text{CO}_3(\text{aq})$ | \rightarrow | $2 \text{Na}^+(\text{aq})$ | $+$ | $\text{CO}_3^{2-}(\text{aq})$ |
| c) | $\text{SrCl}_2(\text{aq})$ | \rightarrow | $\text{Sr}^{2+}(\text{aq})$ | $+$ | $2 \text{Cl}^-(\text{aq})$ |

4. a) $\text{K}_2\text{CO}_3(\text{aq})$ \rightarrow $2 \text{K}^+(\text{aq})$ + $\text{CO}_3^{2-}(\text{aq})$
 0.150 mol/L 0.300 mol/L 0.150 mol/L
- b) $\text{Al}(\text{OH})_3(\text{aq})$ \rightarrow $\text{Al}^{3+}(\text{aq})$ + $3 \text{OH}^-(\text{aq})$
 1.25 mol/L 1.25 mol/L 3.75 mol/L
- c) $\text{Sr}(\text{NO}_3)_2(\text{aq})$ \rightarrow $\text{Sr}^{2+}(\text{aq})$ + $2 \text{NO}_3^-(\text{aq})$
 0.375 mol/L 0.375 mol/L 0.750 mol/L
5. a) aq b) aq c) aq d) aq e) s
 f) s g) aq h) s i) s j) s
 k) aq l) s
6. a) 0.783 mol b) 0.00984 mol c) 0.0325 mol d) 0.0236 mol
7. a) 19.4 g b) 121 g c) 0.514 g d) 64.1 g
8. a) 0.278 mol/L b) 1.98 mol/L c) 0.171 mol/L d) 1.34 mol/L e) 0.0253 mol/L

9. many possible answers

10. open-ended

11. a) 342.34 g/mol b) 17.04 g/mol c) 153.81 g/mol d) 58.14 g/mol e) 269.56 g/mol
 f) 74.10 g/mol g) 179.64 g/mol h) 284.07 g/mol
12. 80.3 g 13. 0.0587 mol/L 14. 312 g 15. 3.25 mL 16. 241 g 17. 243 kg
 18. 71.6 g 19. 1.88 mol/L 20. 0.604 mol 21. 152 g 22. 5.72×10^3 g
 23. 699 g 24. 0.0705 mol/L 25. 0.569 mol