Topic: Chemical compounds

Question: Beryllium fluoride has the molecular formula BeF_2, and it has a molar mass of about 47 g/mol. If the molar mass of beryllium is 9 g/mol and the molar mass of fluorine is 19 g/mol, find the mass of a beryllium fluoride sample containing 228 g of fluorine.

Answer choices:

A 210 g

B 242 g

C 182 g

D 282 g

Solution: D

Based on its molecular formula, one molecule of beryllium fluoride contains 1 beryllium atom and 2 fluorine atoms. Since fluorine has a molar mass of 19 g/mol, one mole of beryllium fluoride contains

$$2(19) = 38 \text{ g}$$

of fluorine. Therefore, since the molar mass of beryllium fluorine is 47 g, we can say that the ratio of the mass of the fluorine in any sample of beryllium fluoride to the total mass of that sample is

$$\frac{38 \text{ g}}{47 \text{ g}}$$

If we want the total mass x of a sample of beryllium fluoride that contains 228 g of fluorine, we can set up a proportion.

$$\frac{38 \text{ g}}{47 \text{ g}} = \frac{228 \text{ g}}{x}$$

$$\frac{38}{47} = \frac{228 \text{ g}}{x}$$

Cross multiplying, we get

$$38x = (228 \text{ g})(47)$$

$$38x = 10{,}716 \text{ g}$$

$$x = 282 \text{ g}$$

Topic: Chemical compounds

Question: What is the molar mass of H_2O, if the molar mass of hydrogen is 1.00794 g/mol and the molar mass of oxygen is 15.9994 g/mol?

Answer choices:

A 18.01528

B 18.1

C 19.25672

D None of these

Solution: A

Because one molecule of H_2O has two atoms of hydrogen and one atom of oxygen, the mass of one mole of H_2O is

$$2(1.00794) + 15.9994$$

$$2.01588 + 15.9994$$

$$18.01528 \text{ g}$$

So the molar mass of H_2O is 18.01528 g/mol.

Topic: Chemical compounds

Question: What is the molar mass of NH_3, if the molar mass of hydrogen is 1.00794 g/mol and the molar mass of nitrogen is 14.0067 g/mol?

Answer choices:

A 16.03052

B 17.03052

C 18.03052

D 15.00301

Solution: B

Because one molecule of NH_3 has one atom of nitrogen and three atoms of hydrogen, the mass of one mole of NH_3 is

$$14.0067 + 3(1.00794)$$

$$14.0067 + 3.02382$$

$$17.03052 \text{ g}$$

So the molar mass of NH_3 is 17.03052 g/mol.