2.

c)  $CH_4 + \frac{2}{2}O_2 \rightarrow$ 

complete combustion

 $CO_2 + \frac{2}{9} H_2O$ 

```
i.
         iron (II) oxide → iron + oxygen
         Fe^{2+} O^{2-} \rightarrow Fe + O_2
                                                                          Reaction Type = Decomposition
         FeO
                     \rightarrow Fe + O<sub>2</sub> (skeletal)
         2 FeO →
                           2 \text{ Fe} + O_2 \text{ (balanced)}
         zinc + sodium sulphide \rightarrow sodium + zinc sulfide
         Zn + Na^{1+} S^{2-} \rightarrow Na + Zn^{2+} S^{2-}
                                                                          Reaction Type = Single Replacement
         Zn + Na₂S →
                                   Na + ZnS (skeletal)
         Zn + Na_2S \rightarrow 2 Na + ZnS (balanced)
 iii.
         calcium chloride + lithium nitrate →
                                                       calcium nitrate + lithium chloride
           Ca^{2+} Cl^{1-} + Li^{1+} NO_3^{1-} \rightarrow
                                                       Ca^{2+} NO_3^{1-} +
                                                                              Li<sup>1+</sup> Cl<sup>1-</sup>
                                                                                            Reaction Type = Double Replacement
          CaCl_2 + Li(NO_3) \rightarrow Ca(NO_3)_2 + LiCl (skeletal)
         CaCl_2 + 2 Li(NO_3) \rightarrow Ca(NO_3)_2 + 2 LiCl (balanced)
         magnesium + oxygen → magnesium oxide
 iv.
                                            Mg^{2+} O^{2-}
               + O_2 \rightarrow
                                                                                             Reaction Type = Synthesis
           Mg + O_2 \rightarrow MgO  (skeletal)
           2 Mg + O_2 \rightarrow 2 MgO (balanced)
         chlorine + silver bromide → bromide + silver chloride
  ٧.
                  + Ag<sup>1+</sup> Br<sup>1-</sup>
                                         \rightarrow Br<sub>2</sub> + Ag<sup>1+</sup> Cl<sup>1-</sup>
           Cl<sup>1-</sup>
                                                                                             Reaction type = Single Replacement
                                           \rightarrow Br<sub>2</sub> + AgCl (skeletal)
                  Cl<sub>2</sub> + AgBr
                  Cl<sub>2</sub> + 2 AgBr
                                              \rightarrow Br<sub>2</sub> + 2 AgCl (balanced)
         copper + barium sulphate → barium + copper (I) sulphate
 vi.
         Cu + Ba^{2+} SO_4^{2-} \rightarrow Ba + Cu^{1+} SO_4^{2-}
                                                                                             Reaction Type: Single Replacement
          Cu + BaSO_4 \rightarrow Ba + Cu_2SO_4 (skeletal)
          2 Cu + BaSO<sub>4</sub> \rightarrow Ba + Cu<sub>2</sub>SO<sub>4</sub> (balanced)
          sodium\ hydroxide\ +\ calcium\ carbonate\ \rightarrow\ sodium\ carbonate\ +\ calcium\ hydroxide 
 vii.
           Na^{1+}OH^{1-} + Ca^{2+}CO_3^{2-} \rightarrow Na^{1+}(CO_3)^{2-} + Ca^{2+}(OH)^{1-} Reaction type = Double Replacement
         NaOH + CaCO_3 \rightarrow Na_2(CO_3) + Ca(OH)_2 (skeletal)
         2 NaOH + CaCO<sub>3</sub> \rightarrow Na<sub>2</sub>(CO<sub>3</sub>) + Ca(OH)<sub>2</sub> (balanced)
viii.
         potassium chloride → potassium + chlorine
                  K^{1+} Cl^{1-} \rightarrow K + Cl_2
                                                                                            Reaction Type = Decompos
                       KCI \rightarrow K + Cl_2
                                                     (skeletal)
                   2 KCl \rightarrow 2 K + Cl<sub>2</sub>
                                                    (balanced)
 ix.
         magnesium nitrate + sodium hydroxide → magnesium hydroxide + sodium nitrate
         Mg^{2+}NO_3^{1-} + Na^{1+}OH^{1-} \rightarrow
                                                               Mg^{2+} OH^{1-} + Na^{1+} NO_3^{1-}
            Mg(NO_3)_2 + NaOH
                                            \rightarrow
                                                                Mg(OH)_2
                                                                                  +
                                                                                         NaNO<sub>3</sub> (skeletal)
                                             \rightarrow
                                                                                       2 NaNO<sub>3</sub> (balanced)
            Mg(NO_3)_2 + 2 NaOH
                                                                Mg(OH)_2
                                                                                  +
3. For each of the following combustion reactions, complete the balance chemical reaction
a) C_2H_4 + \frac{3}{2} O_2 \rightarrow \frac{2}{2} CO_2 + \frac{2}{2} H_2O
complete combustion
b) {}^{3} C_{2}H_{6} + {}^{6} O_{2} \rightarrow CO_{2} + CO + {}^{4} C + {}^{9} H_{2}O
incomplete combustion
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4. Solution A has a mass of 62g. Solution B has a mass of 89g. When they are mixed, a chemical reaction occurs in which a gas is produced. If the mass of the final mixture is 146g, what mass of gas was produced? Define the law of conservation of mass using this example.