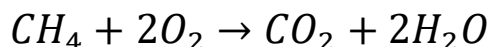


P11. Given a reaction of burning gas methane (CH₄) in air:



Hint: chemical equation is based on molecules (not weights);

(1) find molecular weights (in g/mol);

(2) find numbers of moles of methane and oxygen;

(3) compare (# CH₄ moles) to (# O₂ moles / 2), e.g., 3 CH₄ moles matches to 6 O₂ moles; (a) if CH₄ is larger, the CH₄ excess will be left and O₂ will be used up; and (b) vice versa;

(4) the combined product weight = methane_g + oxygen_g - the excess;

(5) work out the product proportion to find CO₂ and H₂O weights, e.g., total CO₂ weight/total product weight = CO₂ / (CO₂ + 2 H₂O).

Use the P11 template (P11_Template.py; note: template is to ensure the exact display format and allows smooth auto-grading)

Example 1:

=====
Methane (CH₄, in g):**200**

Oxygen (O₂, in g):**200**

CH₄: 149.86 g. O₂ 0.00 g. CO₂ 137.54 g. H₂O 112.60 g
=====

Example 2:

=====
Methane (CH₄, in g):**100**

Oxygen (O₂, in g):**400**

CH₄: 0.00 g. O₂ 1.10 g. CO₂ 274.32 g. H₂O 224.58 g
=====

Here is P11_template.py

```
"""
Given a reaction of burning gas methane (CH4) in air:
CH4 + 2 O2 --> CO2 + 2 H2O and the fact that
when either CH4 or O2 runs out first the reaction stops and the other is left over.
Write a function, named "ch4combust", to take in weights (in gram) of CH4 and O2 and
reports what will be left after the burning.
Note:
    molar mass M = mass (in kg) of 1 mole of the substance;
    1 mole = 6.02214076×1023 particles (e.g., molecules, atoms, ions, electrons, etc.).
    molar mass of water = 18.015 g/mol
    atomic weight:
        H ~ 1.008 g/mol; C ~ 12.011 g/mol; O ~ 15.999 g/mol
https://en.wikibooks.org/wiki/General\_Chemistry/Energy\_changes\_in\_chemical\_reactions
"""

# Write your function here

# (1) find molecular weights (in g/mol)
# e.g., CH4 weighs 12.011 + 1.008*4 (g/mol)

# (2) find numbers of moles of methane and oxygen,
# e.g., # CH4 moles = (methane in g)/(CH4 weight in g/mol);

# (3) compare (# CH4 moles) to (# O2 moles / 2);
# e.g., 3 CH4 moles matches to 6 O2 moles.

# if CH4 is larger, the CH4 excess will be left
# and O2 will be used up;
# and vice versa.
# (4) The combined product weight = methane_g + oxygen_g - the excess

# (5) work out the product proportion to find CO2 and H2O weights,
# e.g., total CO2 weight/total product weight = CO2 / (CO2 + 2 H2O).

# Do not edit below this line.
# =====

if __name__ == '__main__':
    m = input('Methane (CH4, in g):')
    o = input('Oxygen (O2, in g):')
    print('CH4: %.2f g. O2 %.2f g. CO2 %.2f g. H2O %.2f g'%
          ch4combust(float(m), float(o)))
```