

THERMODYNAMICS

Practice questions

1 . calculate ∆U,q and W, when 2.0 mole of an ideal gas at 25 degree Celsius are Compressed isothermally and reversibly from one bar to 10 bar

Hint : ∆U = 0 , W = 2.303 nRT log P2/P1

∆U = q + W

2 . 3 moles of H gas are compressed isothermally and reversibly from 60 L to 20 L and 8.50kJ of work is done on it . Assuming ideal behavior, calculate the temperature of the gas.

Hint: W = 2.303nRTlogV2/V1

3. The heat of combustion of gaseous methane (CH4) at constant volume is measured in bomb calorimeter at298K and is found to be -885.4kJ per mole .find the value of enthalpy change?

Hint: CH4 (g) + O2(g) 🡪 CO2(g) + H2O(l)

4. The enthalpy change (∆H) for the reaction

N2(g) + H2 🡪 NH3(g) is -92.38 kJ at 298K.what is ∆U at 298K ?

Hint: ∆H = ∆U + ∆ngRT

5. Enthalpy of combustion of carbon to CO2 (g) is -393.5kJ per mole. Calculate the heat released upon the formation of 35.2g of CO2 from carbon and dioxygen gas.

Hint: C(s) + O2 (g) 🡪CO2 (g)

6. A swimming pool contains 1 x 10^5 L of water . How much energy in joules is required to raise the temperature of water from 20 degree Celsius to 25 degree Celsius? The specific heat capacity of water is 4.184/ degree Celsius gram.

Hint: Heat supplied = Mass x specific heat capacity x rise in temperature

m x Cs x ∆T

7. Calculate the number of kJ necessary to raise the temperature if 60.0 g of aluminium from 35 degree to 55 degree Celsius. Molar heat capacity of AL is 24J per mole and per Kelvin.

Hint: Energy required = m x C x ∆T