Universiti Malaysia PAHANG
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BSK1133 PHYSICAL CHEMISTRY

PRACTICE 6

PREPARED BY:

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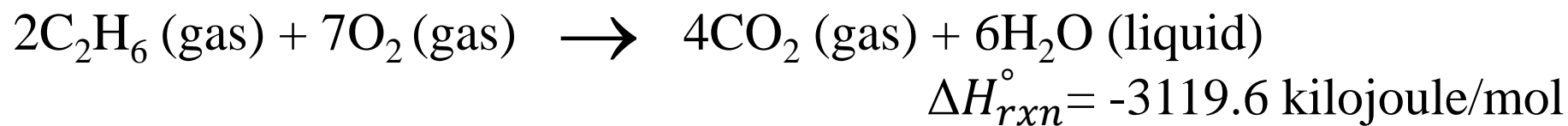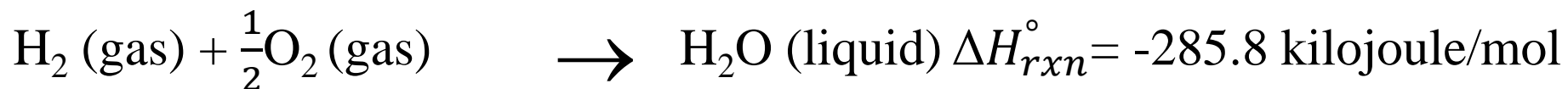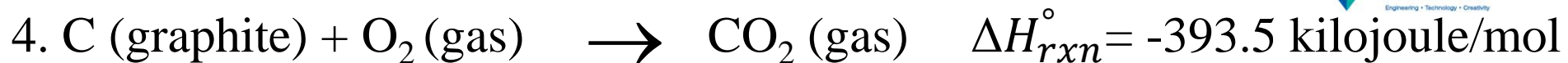### Faculty of Industrial Sciences & Technology
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1. A man was sweating when he walked from his house to his office. What do you expect the sign for the changes of work (w) and enthalpy (H) for this phenomena?

2. State two physical quantities that are **NOT** a state function.

3. Magnesium reacted with an acid was carried out in a calorimeter. The temperature of 23.0 grams of liquid water was increased from 25.0°C to 62.0°C in the calorimeter. Calculate the heat energy associated with this reaction. (Given specific heat of water = 4.18 J/g°C).

4. C (graphite) + O_2 (gas) $\longrightarrow$ CO_2 (gas) ΔH°_{rxn}= -393.5 kilojoule/mol

H_2 (gas) + $\frac{1}{2}O_2$ (gas) $\longrightarrow$ H_2O (liquid) ΔH°_{rxn}= -285.8 kilojoule/mol

$2C_2H_6$ (gas) + $7O_2$ (gas) $\longrightarrow$ $4CO_2$ (gas) + $6H_2O$ (liquid)
$$\Delta H^{\circ}_{rxn}= -3119.6 \text{ kilojoule/mol}$$

Determine ΔH°_{rxn} for the reaction below:
$2C$ (graphite) + $3H_2$ (gas) $\longrightarrow$ C_2H_6 (gas) ΔH°_{rxn} = _____
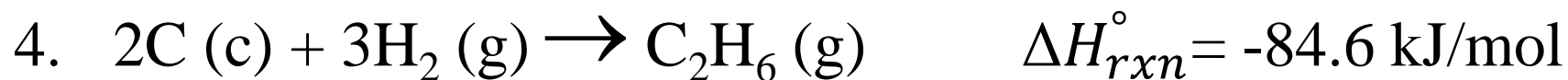
5. Calculate the work done (in Joules) on the system when 8 L of a gas is compressed to 2.0 L by a constant external pressure of 4 atm. Briefly discuss your answer. (Given: 1L atm = 101.325 J).

ANSWERS:

1. $w = -$, $\Delta H = -$

2. heat and work

3. $[23 \times (62-25) \times 4.18] = 3557.18$ J

4. $2C \text{ (c)} + 3H_2 \text{ (g)} \longrightarrow C_2H_6 \text{ (g)} \qquad \Delta H^{\circ}_{rxn} = -84.6$ kJ/mol

5. $w = -P\Delta V = -P(V_2 - V_1)$

   $\qquad = -[4 \text{ atm } (2.0 \text{ L} - 8.0 \text{ L}) \times \frac{101.325 \text{ J}}{1 \text{ L atm}}]$

   $\qquad = 2.4318 \times 10^3$ J

   Positive value for work shows that work is done on the system by the surroundings. It also means the system gains energy.

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