

PROBLEM 2-37

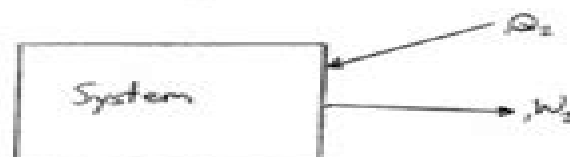
GIVEN: A system of fixed mass at constant pressure and temperature

FIND: Equivalent system form of Eqn. 2.35 (First Law) which is used to define the heat of reaction.

ASSUMPTIONS: expansion/contraction of the system boundary is a reversible process; only work done by system is boundary expansion/contraction

APPROACH: Write the first law for the system. Substitute the appropriate expression for constant pressure work and solve for the specific heat transfer.

Sketch of system:



first law for a system:

$$Q_2 - W_2 = m(u_2 - u_1)$$

for a system at constant pressure the reversible work can be expressed as

$$W_2 = \int_1^2 P dV = P(V_2 - V_1) = mP(v_2 - v_1) \quad v \equiv \text{specific volume}$$

substituting into the first law

$$Q_2 - mP(v_2 - v_1) = m(u_2 - u_1)$$

$$Q_2 = m[(u_2 + Pv_2) - (u_1 + Pv_1)] = m(h_2 - h_1)$$

$$q_2 = Q_2/m = h_2 - h_1$$

if state 1 is the reactants and state 2 is the products then

$$q = h_p - h_r \quad \leftarrow \text{same form as Eqn 2.35}$$

COMMENTS: Note that the first law for a constant pressure system has the same form as for a control volume. This is only true for constant pressure. Also, the internal energies u_1 and u_2 are mixture internal energies. Even assuming ideal gas behavior, $u_1 \neq u_2$ at constant temperature if the composition changes. (see Joule's experiment with gases and internal energy)

Introduction To Combustion Turns Solution Manual

Patrick Vollmar



Introduction To Combustion Turns Solution Manual:

Unveiling the Magic of Words: A Review of "**Introduction To Combustion Turns Solution Manual**"

In a world defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their capability to kindle emotions, provoke contemplation, and ignite transformative change is truly awe-inspiring. Enter the realm of "**Introduction To Combustion Turns Solution Manual**," a mesmerizing literary masterpiece penned by a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve to the book is central themes, examine its distinctive writing style, and assess its profound effect on the souls of its readers.

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