Answers to Ch. 10 Problems

(2) Some energy isn't "concentrated" enough to do work.

(4) A, B 10.1a): Ball A can roll down hill
10.1 b) Ball B can roll down hill

(7) a) NO - it's an average energy
b) yes - it's a total energy

(9) More heat is transfered in the second example due to the greater difference in temperatures.

(11) Stored E; E stored in bonds between atoms.

(10) (a) Endothermic; Assuming the KBr is the system, heat flows from the water into the KBr in order to break the KBr into K^+ & Br^- ions.

(c) Exothermic; assuming the H_2SO_4 is the system, heat goes into the surroundings (the water) as bonds form between the water & the dissolved acid.

(15) (a) Energy leaves system & goes into surroundings.

(b) Energy leaves the surroundings and goes into the system.

(17) (a) the chemical you are studying is the system.

(19) (a) $\Delta E = q + w = 51\ kJ - 15\ kJ = +36\ kJ$

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(20) $\Delta E = q + w = +45\,kJ - 29\,kJ = +16\,kJ$

(23) lower

(25) (a) $7845\,cal \times \frac{4.18\,J}{1\,cal} = 32792\,J = 32.8\,kJ$

(c) $62.142\,kcal \times \frac{4.18\,kJ}{1\,kcal} = 259.8\,kJ = 260\,kJ = 2.60 \times 10^2\,kJ$

(28) $35.2\,g = m$ $\quad q = mC\Delta T$

$1251\,J = q$ $\quad 1251\,J = (35.2\,g)(C)(25^\circ C)$

$\Delta T = 25^\circ C$

$C_p = ?$ $\quad \frac{1251\,J}{(35.2\,g)(25^\circ C)} = 1.42\,\frac{J}{g^\circ C}$

(30) $S + O_2 \rightarrow SO_2 \quad \Delta H = -296\,kJ/mol$

(a) $275\,g \times \frac{1\,mol}{32.06\,g} \times \frac{-296\,kJ}{1\,mol} = -2538.989 = -2540\,kJ = \Delta H$

2,540 kJ of heat is released

(b) $25\,mol \times \frac{-296\,kJ}{mol} = -7400\,kJ = \Delta H$ $\quad$ 7400 kJ of heat are released

(c) $150.\,g\,SO_2 \times \frac{1\,mol\,SO_2}{64.1\,g\,SO_2} \times \frac{-296\,kJ}{1\,mol\,SO_2} = -693\,kJ = \Delta H$

693 kJ are released

(33) $2C + 2O_2 \longrightarrow 2CO_2$ $\quad \Delta H = 2 \times (-394) = -788\ kJ$

$H_2 + \frac{1}{2}O_2 \longrightarrow H_2O$ $\quad \Delta H = -286\ kJ$

$+ \quad 2CO_2 + H_2O \longrightarrow C_2H_2 + \frac{5}{2}O_2 \quad + \Delta H = +1300\ kJ$

$2C + H_2 \longrightarrow C_2H_2 \qquad \Delta H = +226\ kJ$

(35) $6FeO + 2CO_2 \longrightarrow 2Fe_3O_4 + 2CO \qquad \Delta H = -36\ kJ$

$+ \quad 3Fe_2O_3 + 9CO \longrightarrow 6Fe + 9CO_2 \quad + \Delta H = -69\ kJ$

$6FeO + 3Fe_2O_3 + 7CO \longrightarrow 6Fe + 2Fe_3O_4 + 7CO_2 \qquad \Delta H = -105\ kJ$

$+ \quad 2Fe_3O_4 + CO_2 \longrightarrow 3Fe_2O_3 + CO \qquad \Delta H = +39\ kJ$

$6FeO + 6CO \longrightarrow 6Fe + 6CO_2 \qquad \Delta H = -66\ kJ$

$FeO + CO \longrightarrow Fe + CO_2 \qquad \Delta H = -11\ kJ$

(36) quality = how useful quantity = how much.

Energy is conserved, useful energy is decreasing.

(39) Greenhouse gases regulate temp. of atmosphere/planet.

Too much greenhouse gas = too hot of a planet.

(41) 1ST law = E conserved. E given off by ball rolling down = E used up by reverse process

(43) "Energy spread." Heat energy released during a rxn results in a decrease of useful energy in system.