Iufer

Unit 10 Review

54) Heat is being used to melt the ice (phase Δ)

55) a) $3.50 \text{ mol } H_2O \times \frac{-6.02 \text{ kJ}}{1 \text{ mol}} = -21.07 \text{ kJ}$

b) $0.44 \text{ mol } H_2O \times \frac{-40.7 \text{ kJ}}{1 \text{ mol}} = -17.908 \text{ kJ}$

c) $1.25 \text{ mol NaOH} \times \frac{-445.1 \text{ kJ}}{\text{mol}} = -556.375 \text{ kJ}$

d) $0.15 \text{ mol } C_2H_5OH \times \frac{43.5 \text{ kJ}}{1 \text{ mol}} = 6.525 \text{ kJ}$

56) $\Delta H = -17.3 \text{ kJ/mol}$ exothermic $\therefore$ water heats up

62) Substance B; for equal masses, the substance with greater heat capacity undergoes the smallest temperature change

63) $3.20 \text{ kcal} \times \frac{1000 \text{ cal}}{1 \text{ kcal}} \times \frac{4.184 \text{ J}}{1 \text{ cal}} \times \frac{1 \text{ kJ}}{1000 \text{ J}} \times \frac{1 \text{ mol}}{6.01 \text{ kJ}} \times \frac{18.0 \text{ g}}{1 \text{ mol}} = 40.1 \text{ g}$ melted

$1.000 \text{ kg} - .0401 \text{ kg} = .960 \text{ kg}$ ice left

65) $45.2 \text{ g } H_2O \times \frac{1 \text{ mol}}{18.0 \text{ g } H_2O} \times \frac{-40.7 \text{ kJ}}{1 \text{ mol}} = -102.2 \text{ kJ}$

-102200 J

70) $40.0 \text{ g } H_2O \times \frac{1 \text{ mol}}{18 \text{ g}} \times \frac{6.01 \text{ kJ}}{1 \text{ mol}} = 13.36 \text{ kJ}$

$13360 \text{ J} \times \frac{1 \text{ cal}}{4.184 \text{ J}} = 3193 \text{ cal}$

3.193 kcal

b) $-13360 \text{ J} = m(4.184 \frac{\text{J}}{\text{g°C}})(0-25)$

$m = 128 \text{ g}$

65) $\Delta H_{cond} = -40.7 \ KJ/mol$
$45.2g \ H_2O$

$$45.2g \ H_2O \times \frac{1 mol}{18.0g \ H_2O} = 2.5 mol \ H_2O$$

$$2.5 mol \ H_2O \times \frac{-40.7 \ KJ}{1 \ mol} \times \frac{1000 J}{1 KJ} = -101750 J$$

70) a. melt $\Delta H_{fus} = 6.01 \frac{KJ}{mol}$

$$40.0g \times \frac{1 mol \ H_2O}{18.0 \ g H_2O} \times \frac{6.01 \ KJ}{1 mol} = 13.355 \ KJ$$
$13355 J$ A

$$13355 J \times \frac{1 cal}{4.184 J} = 3191.9 \ cal$$ A
3.191 Kcal A

b. g of H_2O cooled?

$$-13355J = m \left(4.184 \frac{J}{g°C}\right)(0-25)$$
$$m = 128g$$

71) $\Delta H_{vap} = 43.5 KJ/mol$
$m = 25.0g$

$$25.0g \times \frac{1 mol}{46.06 g C_2H_5OH} = 0.542 \ mol \times \frac{43.5 KJ}{1 mol} = 23.6 KJ$$

72) $445 KJ = 445000 J$
$\Delta T = 100 - 25 = 75°C$
$C = 4.184 \frac{J}{g°C}$

$$445000J = m \left(4.184 \frac{J}{g°C}\right)(75°C)$$
$$m = 1418 g \ H_2O$$

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71) $25.0g\ C_2H_5OH \times \frac{1\,mol}{46\,g\ C_2H_5OH} \times \frac{43.5\,kJ}{1\,mol} = 23.6\ kJ$

72) $445{,}000J = m\,(4.184\,\frac{J}{g°C})(100-25)$

$m = 1{,}418\,g$

73) $4.79g\ C_2H_4 \times \frac{1\,mol}{28.04\,g} \times \frac{-1390\,kJ}{1\,mol} = 237.8\ kJ$

75) $45.0g \times \frac{1\,mol}{128.18\,g} \times \frac{191.2\,kJ}{1\,mol} = 67.1\ kJ$

76) heat always moves from hotter objects to colder objects

77) $m = 2.0\,L = 2000\,mL = 2000\,g\ H_2O$

$\Delta T = 7 - 25 = -18°C$

$C = 4.184\,\frac{J}{g°C}$

$q = 2000g\,(4.184\,\frac{J}{g°C})(-18)$

a) $q = -150624\ J$ by H_2O

b) $q = 150624\,J$ by fridge

c) assume no heat lost to surroundings

Hint: what's the difference between heat and temperature?