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1. $H_2O(\ell) \longrightarrow H_2O(g)$ $\quad \Delta H_{VAP} = +44.0\ \frac{kJ}{mol}$

$m = 50.0\ g$

$$n = \frac{m}{M}$$

$$= \frac{50.0\ g}{18.02\ g/mol}$$

$$= 2.7746\ldots\ mol$$

$$\Delta H = n \cdot \Delta H_{VAP}$$

$$= (2.7746\ldots\ mol)\left(+44.0\ \frac{kJ}{mol}\right)$$

$$= +122.086\ldots\ kJ$$

∴ The enthalpy change is $+122\ kJ$.

2. $Na_2SO_4 \cdot 10H_2O(\ell) \rightarrow Na_2SO_4 \cdot 10H_2O(s)$

$m = 2.50\ kg$

$\Delta H_r = -78.0\ \frac{kJ}{mol}$ ("releases")

$$n = \frac{m}{M}$$

$$= \frac{2500\ g}{322.24\ g/mol}$$

$$= 7.7581\ldots\ mol$$

$$\Delta H = n \cdot \Delta H_r$$

$$= (7.7581\ldots\ mol)\left(-78.0\ \frac{kJ}{mol}\right)$$

$$= -605.139\ldots\ kJ$$

∴ The enthalpy change is $-605\ kJ$.

3. $C_3H_8(\ell) \longrightarrow C_3H_8(g)$ $\Delta H_{VAP} = +15.7 \frac{kJ}{mol}$

$m = ?$

$\Delta H = +100.0\ kJ$

$$n = \frac{\Delta H}{\Delta H_{VAP}}$$

$$= \frac{100.0\ \cancel{kJ}}{15.7\ \frac{\cancel{kJ}}{mol}}$$

$$= 6.3694\ldots\ mol$$

$$m = n \cdot M$$

$$= (6.3694\ldots\ \cancel{mol})\left(44.11\ \frac{g}{\cancel{mol}}\right)$$

$$= 280.955\ldots\ g$$

∴ The mass of propane that would vaporize is 281 g.