12.51 (a) Use the enthalpy of fusion ($\Delta H_{\text{fus}}$)

$$\frac{52.4 \text{ g}}{18.0 \text{ g/mol}} \times 6.01 \text{ kJ/mol} = 17.5 \text{ kJ}$$

(b) Freezing is the opposite of melting (aka fusion), so the identical amount of thermal energy must be removed: $17.5 \text{ kJ}$ (-17.5 kJ is also acceptable as an answer).

12.54 (a) Vapor phase
(b) Supercritical fluid
(c) Initially, the sample will be ice. At around -5°C, the ice sublimes and will be entirely vapor at +20°C.

(d) [Graph showing a temperature increase]

(e) Initially, the sample will be vapor. At ~200 atm, the sample will condense to a liquid, and will be entirely liquid at 50 atm.

12.61 (a) Molecular
(b) Metallic
(c) Covalent network