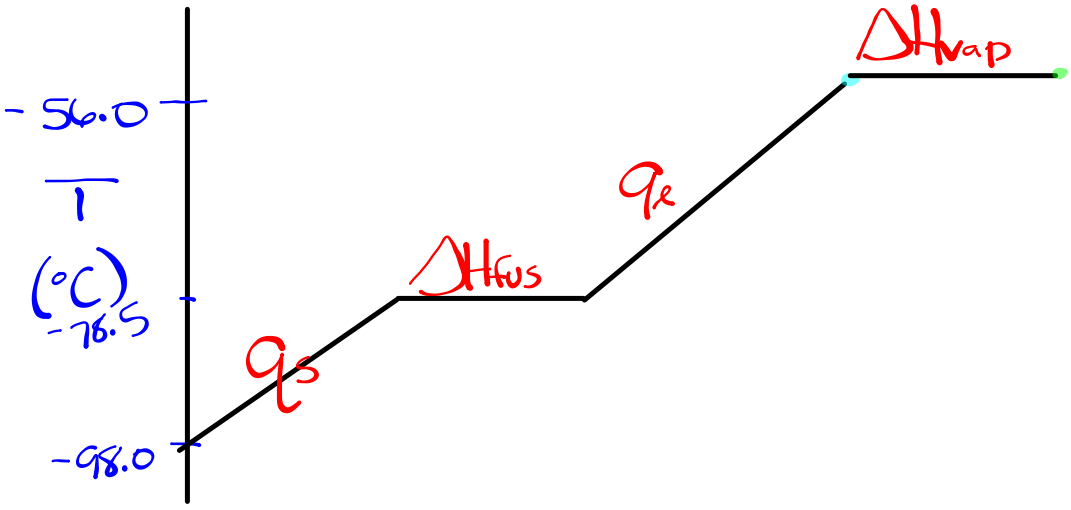
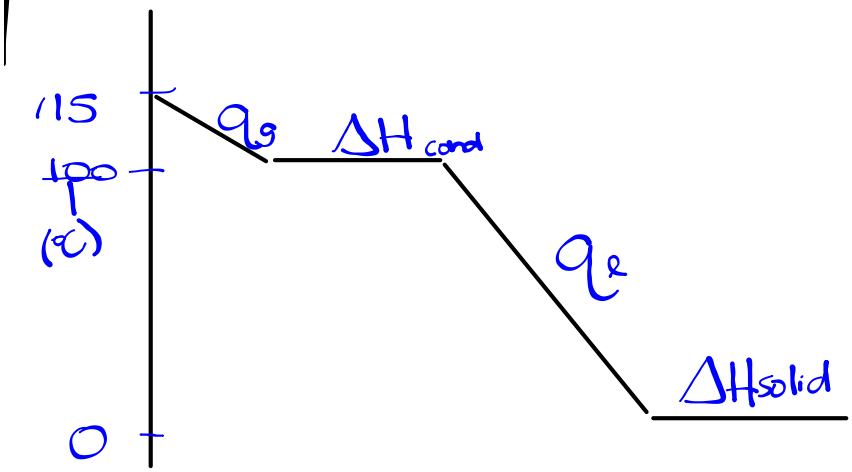
Warm Up

Solid carbon dioxide, at a temperature of -98.0 °C is heated until it becomes a gas at it's boiling point (-56.0 °C). Draw the heating curve. The melting point is -78.5 °C.



20.0 g of steam at 115°C is cooled until it becomes ice at 0.0°C. Calculate the energy change for the system.



$\Delta E_T = q_g + \Delta H_{cond} + q_e + \Delta H_{solid}$

$q_g = mC\Delta T$

$q_g = (20.g)\left(2.01\frac{J}{g°C}\right)(-15°C)$

$q_g = -603\ J$

$\Delta H_{cond} = n H_{cond}$

$\Delta H_{cond} = \left(\frac{20.g}{18.02 g/mol}\right)\left(-40.8\frac{kJ}{mol}\right)$

$\Delta H_{cond} = -45.283 kJ$

H_2O

$q_e = mC\Delta T$

$q_e = (20.g)\left(4.19\frac{J}{g°C}\right)(-100.°C)$

$q_e = -8380\ J$

$\Delta H_{solid} = n H_{solid}$

$\Delta H_{solid} = \left(\frac{20.g}{18.02 g/mol}\right)\left(-6.03\frac{kJ}{mol}\right)$

$\Delta H_{solid} = -6.693 kJ$

$\Delta E_T = (-0.603kJ) + (-45.283kJ) + (-8.380kJ) + (-6.693kJ)$

$\boxed{\Delta E_T = -66.4 kJ}$

Total Energy Changes

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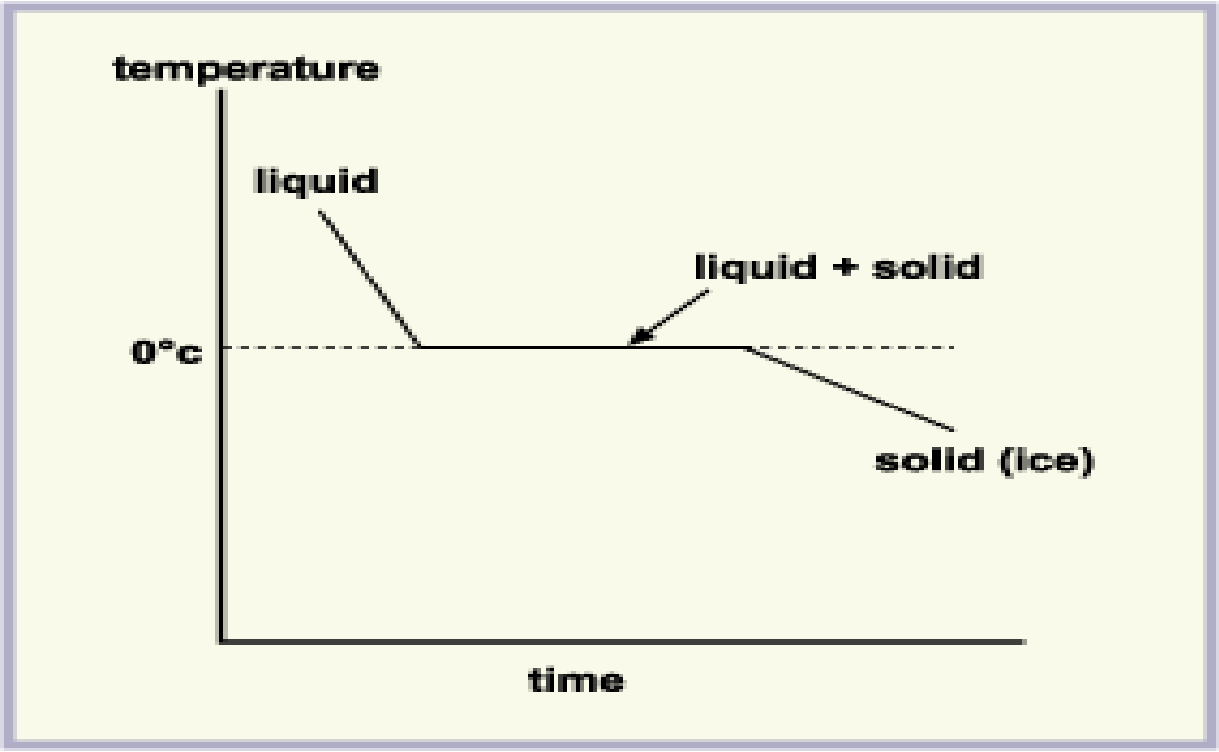
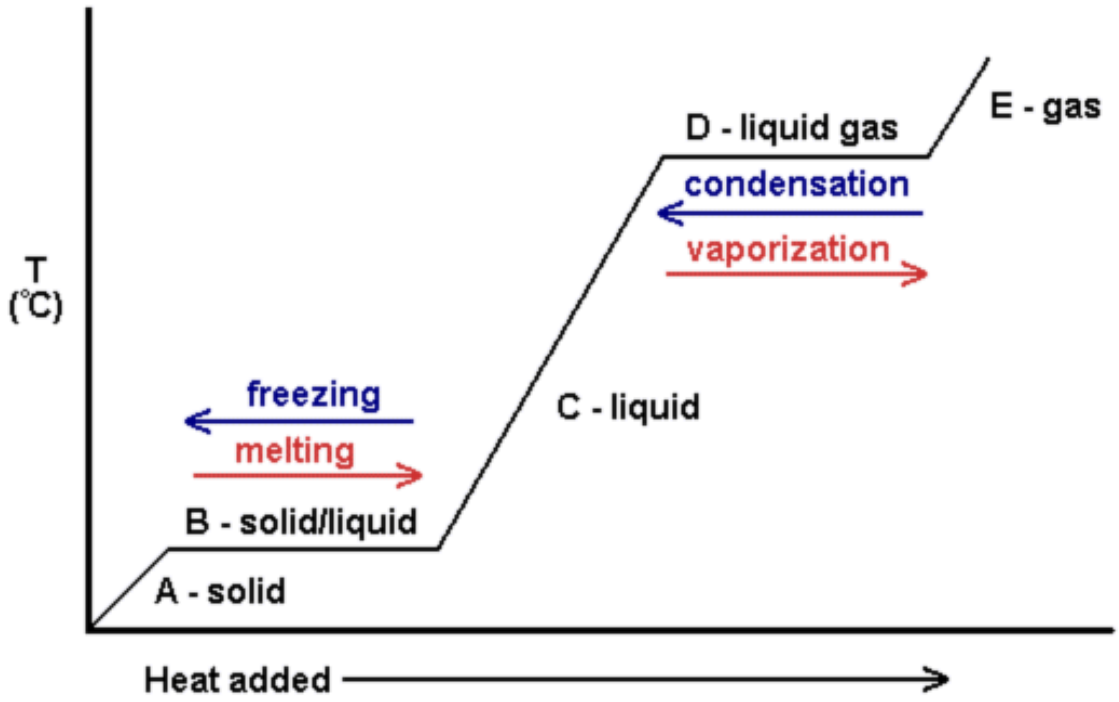

temperature
liquid
liquid + solid
0°c
solid (ice)
time


T
(°C)
E - gas
D - liquid gas
condensation
vaporization
freezing
melting
C - liquid
B - solid/liquid
A - solid
Heat added