Chemistry 1Adv/1SSP (CHEM1901/1903) June 2013

2013-J-2

- 2.25×10^{15} Bq

  The ^{131}I decays to ^{131}Xe(g) which, being a gas, escapes on melting, whilst the ^{137}Cs decays to ^{137}Ba. After 3 months, most of the ^{131}I will have decayed so the sample will be mainly ^{137}Ba with a little ^{137}Sr. After 300 years, the sample will be mainly ^{137}Sr with a little bit of ^{137}Ba remaining.

2013-J-3

- [Ar] $4s^1$

  [Ar] $4s^1\ 3d^{10}\ 4p^3$

  [Kr] $5s^2$

  [He] $2s^2\ 2p^1$

  ruthenium

  erbium

- The Periodic Table groups atoms into groups (columns) based on the number of valence electrons they have. Chemical reactivity is based on the number of valence electrons so elements in the same group have similar chemical properties.

2013-J-4

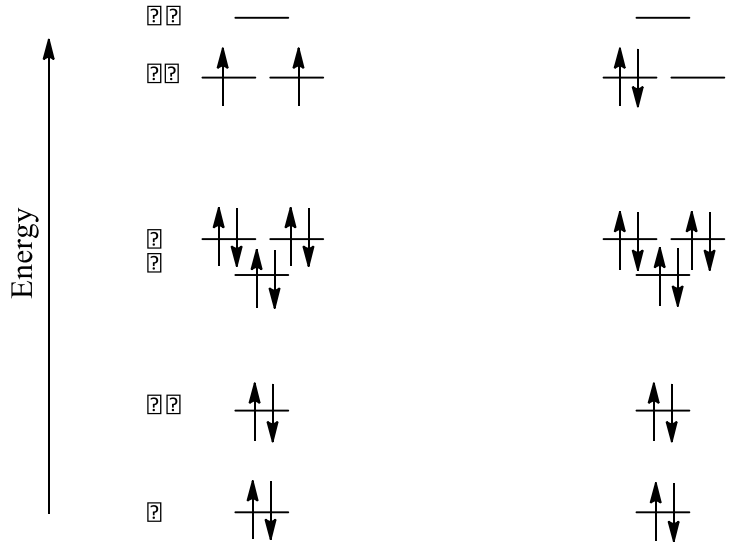
- Sn is metal, so band gap is approximately 0 eV.

  Ge band gap about 0.7 eV [anywhere around (1.1 – 0) / 2 is acceptable]

  3.3 eV

  5.77 g cm^{-3}

2013-J-5



NO^-, NF

1270 nm

2013-J-6

- $[O_2(l)]$: 35.66 M $[O_2(g)]$: 8.6×10^{-3} M
  3500 kPa

2013-J-7

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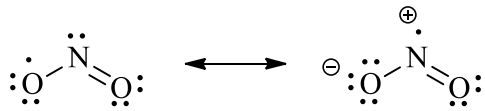
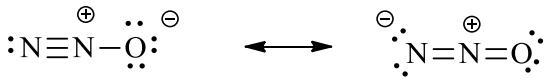
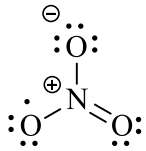
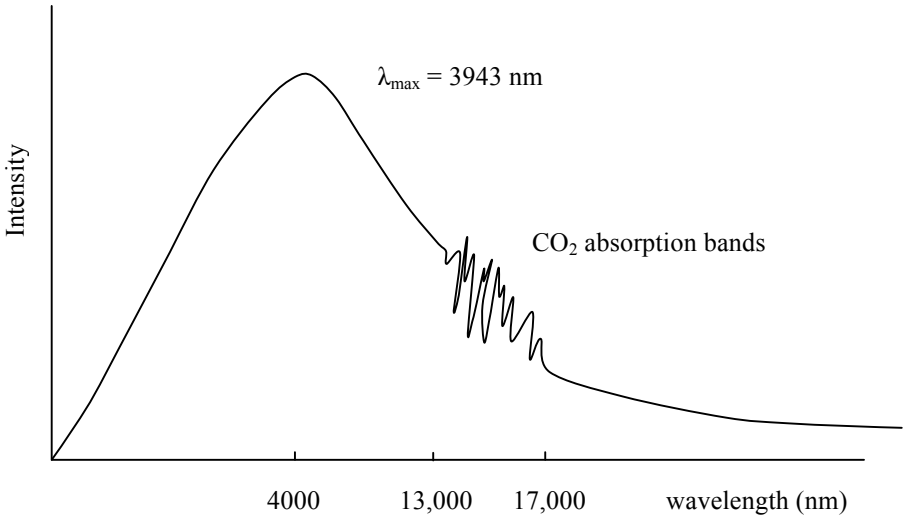
	bent
	bent
	trigonal planar

2013-J-8

- 551 K
  13,000 – 17,000 nm



2013-J-9

- Dipole-dipole forces involving N and O.

  $2C_3H_5N_3O_9(l) \rightarrow 5H_2O(g) + 6CO_2(g) + 3N_2(g) + \frac{1}{2}O_2(g)$

  $\Delta G = \Delta H - T\Delta S$
  Entropy will increase as 1 mol of liquid is converted into 7.25 mol of gases.

  Use a bomb calorimeter *(i.e.* a constant volume calorimeter) of known heat capacity. Charge it with a known amount of water and nitroglycerine, which is then decomposed. By measuring the temperature of the water in the calorimeter before and after decomposition, the enthalpy change for the reaction can be calculated.

2013-J-10

- 3.29 kJ mol^{-1}

2013-J-11

- 91.2%

2013-J-12

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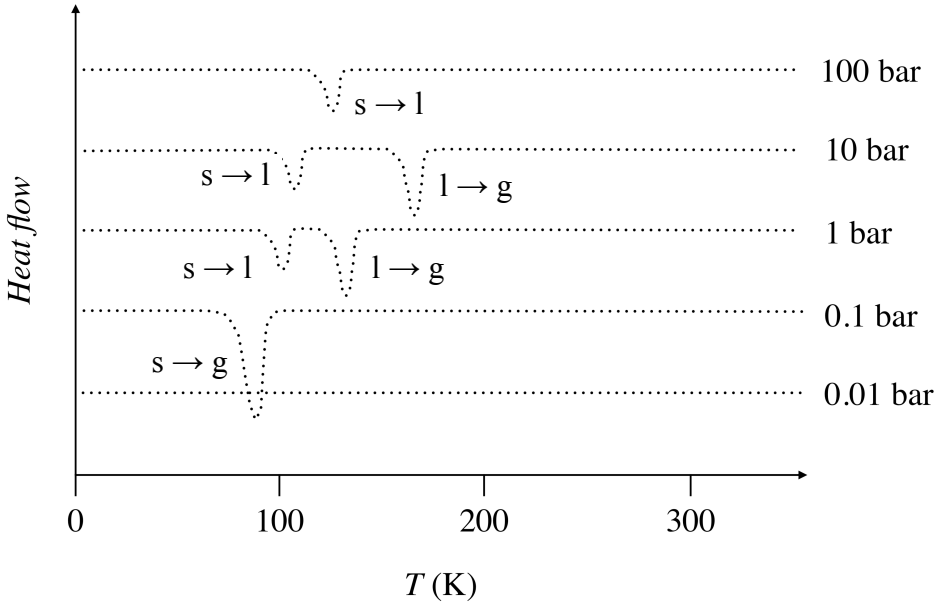

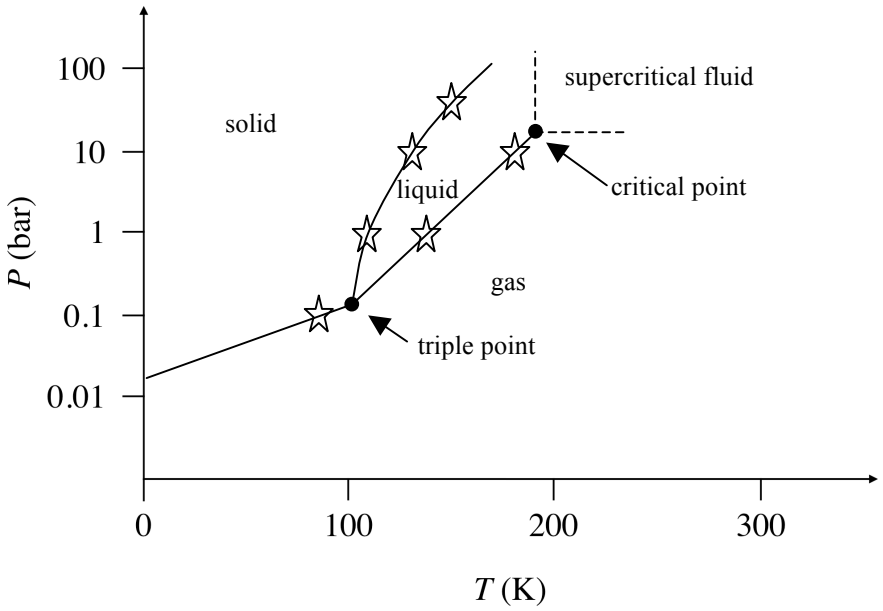

2013-J-13

- $Pb(s) \rightarrow Pb^{2+}(aq) + 2e^-$
  $Sn^{2+}(aq) + 2e^- \rightarrow Sn(s)$
  $Sn^{2+}(aq) + Pb(s) \rightarrow Pb^{2+}(aq) + Sn(s)$
  0.088 V
  $[Pb^{2+}(aq)] = 0.63$ M $[Sn^{2+}(aq)] = 1.4$ M