

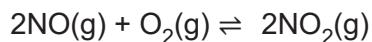
A level Chemistry A

H432/01 Periodic table, elements and physical chemistry

Question Set 11

1. (a)

Nitrogen monoxide, NO, and oxygen, O₂, react to form nitrogen dioxide, NO₂, in the reversible reaction shown in **equilibrium 18.1**.



Equilibrium 18.1

Write an expression for K_c for this equilibrium and state the units.

$$K_c =$$

Units =

[2]

(b)

A chemist mixes together nitrogen and oxygen and pressurises the gases so that their total gas volume is 4.0 dm³.

- The mixture is allowed to reach equilibrium at constant temperature and volume.
- The equilibrium mixture contains 0.40 mol NO and 0.80 mol O₂.
- Under these conditions, the numerical value of K_c is 45.

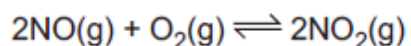
Calculate the amount, in mol, of NO₂ in the equilibrium mixture.

amount of NO₂ = mol

[4]

(c) (i)

The values of K_p for **equilibrium 18.1** at 298 K and 1000 K are shown below.



Equilibrium 18.1

Temperature / K	K_p / atm^{-1}
298	$K_p = 2.19 \times 10^{12}$
1000	$K_p = 2.03 \times 10^{-1}$

Predict, with a reason, whether the forward reaction is exothermic or endothermic.

[1]

- (ii) The chemist increases the pressure of the equilibrium mixture at the same temperature.

State, and explain in terms of K_p , how you would expect the equilibrium position to change.

[3]

Total Marks for Question Set 11: 10

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