# EQUILIBRIUM QUANTITIES 2

1) Work out the actual number of moles of each species are present at equilibrium.

a)

| | $N_{2(g)}$ | + | $3\ H_{2(g)}$ | ⇌ | $2\ NH_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 1 | | 0 |
| change in moles | | | | | |
| equilibrium moles | 0.8 | | | | |

b)

| | $N_{2(g)}$ | + | $3\ H_{2(g)}$ | ⇌ | $2\ NH_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 2 | | 0 |
| change in moles | | | | | |
| equilibrium moles | | | 1.1 | | |

c)

| | $H_{2(g)}$ | + | $I_{2(g)}$ | ⇌ | $2\ HI_{(g)}$ |
|---|---|---|---|---|---|
| initial moles | 2 | | 2 | | 0 |
| change in moles | | | | | |
| equilibrium moles | 0.6 | | | | |

d)

| | $H_{2(g)}$ | + | $I_{2(g)}$ | ⇌ | $2\ HI_{(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 5 | | 1 |
| change in moles | | | | | |
| equilibrium moles | | | 1.4 | | |

e)

| | $2\ SO_{2(g)}$ | + | $O_{2(g)}$ | ⇌ | $2\ SO_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 1 | | 0 |
| change in moles | | | | | |
| equilibrium moles | 0.4 | | | | |

f)

| | $2\ SO_{2(g)}$ | + | $O_{2(g)}$ | ⇌ | $2\ SO_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 0 | | 0 | | 1 |
| change in moles | | | | | |
| equilibrium moles | 0.3 | | | | |

g)

| | $PCl_{5(g)}$ | ⇌ | $PCl_{3(g)}$ | + | $Cl_{2(g)}$ |
|---|---|---|---|---|---|
| initial moles | 2 | | 0 | | 1 |
| change in moles | | | | | |
| equilibrium moles | | | | | 1.4 |

h)

| | $PCl_{5(g)}$ | ⇌ | $PCl_{3(g)}$ | + | $Cl_{2(g)}$ |
|---|---|---|---|---|---|
| initial moles | 2 | | 3 | | 1 |
| change in moles | | | | | |
| equilibrium moles | | | | | 1.3 |

g)

| | $CO_{2(g)}$ | + | $3\ H_{2(g)}$ | ⇌ | $CH_3OH_{(g)}$ | + | $H_2O_{(g)}$ |
|---|---|---|---|---|---|---|---|
| initial moles | 2 | | 4 | | 0 | | 0 |
| change in moles | | | | | | | |
| equilibrium moles | | | 2.5 | | | | |

2) Write expressions to show how many moles of each species are present at equilibrium.

a)

| | $N_{2(g)}$ | + | $3\ H_{2(g)}$ | ⇌ | $2\ NH_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 3 | | 0 |
| change in moles | | | | | |
| equilibrium moles | 1-x | | | | |

b)

| | $N_{2(g)}$ | + | $3\ H_{2(g)}$ | ⇌ | $2\ NH_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 2 | | 2 | | 0 |
| change in moles | | | | | |
| equilibrium moles | | | | | 2x |

c)

| | $H_{2(g)}$ | + | $I_{2(g)}$ | ⇌ | $2\ HI_{(g)}$ |
|---|---|---|---|---|---|
| initial moles | 3 | | 1 | | 0 |
| change in moles | | | | | |
| equilibrium moles | | | 1-x | | |

d)

| | $2\ SO_{2(g)}$ | + | $O_{2(g)}$ | ⇌ | $2\ SO_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 1 | | 0 |
| change in moles | | | | | |
| equilibrium moles | | | 1-x | | |

e)

| | $PCl_{5(g)}$ | ⇌ | $PCl_{3(g)}$ | + | $Cl_{2(g)}$ |
|---|---|---|---|---|---|
| initial moles | 2 | | 1 | | 0 |
| change in moles | | | | | |
| equilibrium moles | | | | | x |

f)

| | $2\ SO_{2(g)}$ | + | $O_{2(g)}$ | ⇌ | $2\ SO_{3(g)}$ |
|---|---|---|---|---|---|
| initial moles | 1 | | 2 | | 1 |
| change in moles | | | | | |
| equilibrium moles | 1-2x | | | | |