



EQUILIBRIUM QUANTITIES 1

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

- 1) $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + 3 \text{H}_2(\text{g})$
- | | | | | |
|-------------------|---|---|-----|---|
| initial moles | 1 | 1 | 0 | 0 |
| equilibrium moles | | | 0.4 | |
- 2) $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$
- | | | | |
|-------------------|------|-----|---|
| initial moles | 0.1 | 0.1 | 0 |
| equilibrium moles | 0.07 | | |
- 3) $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2 \text{HI}(\text{g})$
- | | | | |
|-------------------|----|----|---|
| initial moles | 10 | 10 | 0 |
| equilibrium moles | 3 | | |
- 4) $\text{CO}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g}) + \text{H}_2\text{O}(\text{g})$
- | | | | | |
|-------------------|---|---|-----|---|
| initial moles | 1 | 1 | 0 | 0 |
| equilibrium moles | | | 0.2 | |
- 5) $2 \text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2 \text{SO}_3(\text{g})$
- | | | | |
|-------------------|---|---|-----|
| initial moles | 2 | 2 | 0 |
| equilibrium moles | | | 0.7 |
- 6) $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$
- | | | | |
|-------------------|---|-----|---|
| initial moles | 1 | 1 | 1 |
| equilibrium moles | | 1.8 | |
- 7) $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + 3 \text{H}_2(\text{g})$
- | | | | | |
|-------------------|---|---|---|-----|
| initial moles | 1 | 1 | 1 | 1 |
| equilibrium moles | | | | 1.6 |

- 8) $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$
- | | | | |
|-------------------|----|---|----|
| initial moles | 10 | 0 | 10 |
| equilibrium moles | | | 9 |
- 9) $2 \text{H}_2(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$
- | | | | |
|-------------------|-----|-----|---|
| initial moles | 0.5 | 0.5 | 0 |
| equilibrium moles | 0.1 | | |
- 10) $\text{SO}_2\text{Cl}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g}) + \text{Cl}_2(\text{g})$
- | | | | |
|-------------------|-----|-----|---|
| initial moles | 2.0 | 0 | 0 |
| equilibrium moles | | 0.4 | |
- 11) $2 \text{H}_2(\text{g}) + \text{CO}(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$
- | | | | |
|-------------------|-----|-----|---|
| initial moles | 1.2 | 2.0 | 0 |
| equilibrium moles | | 1.8 | |
- 12) $\text{CO}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g}) + \text{H}_2\text{O}(\text{g})$
- | | | | | |
|-------------------|-----|-----|---|---|
| initial moles | 1.0 | 1.0 | 0 | 0 |
| equilibrium moles | 0.7 | | | |
- 13) $2 \text{A} + \text{B} \rightleftharpoons \text{C} + 3 \text{D}$
- | | | | | |
|-------------------|-----|------|-----|---|
| initial moles | 5.0 | 10.0 | 0 | 0 |
| equilibrium moles | | | 0.5 | |
- 14) $\text{A} + 3 \text{B} \rightleftharpoons 2 \text{C} + \text{D}$
- | | | | | |
|-------------------|-----|-----|---|---|
| initial moles | 2.0 | 1.0 | 0 | 0 |
| equilibrium moles | | 0.4 | | |
- 15) $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$
- | | | | |
|-------------------|---|---|----|
| initial moles | 2 | 2 | 0 |
| equilibrium moles | | | 2x |