ANSWER KEY.

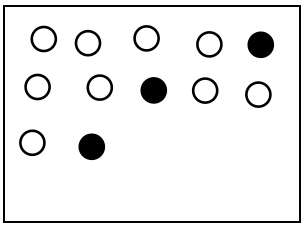
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7.8 Representations of Equilibrium

AP Chemistry | ANSWER KEY

Count first. In one box, particle counts are proportional to concentration. Convert to molarity when you are given moles per particle and a volume.

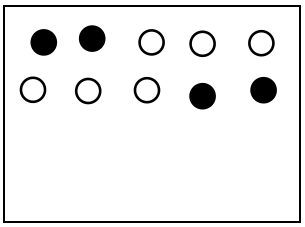
1. The box shows A ⇌ B at equilibrium. Key: ● = A, ○ = B



Calculate K.

3 A and 9 B. K = [B]/[A] = 9/3 = 3.0

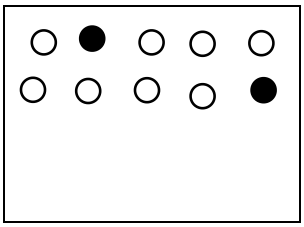
2. For A ⇌ B, K = 1.5. A box starts with 10 A and 0 B. How many of each are present at equilibrium? Draw the box.



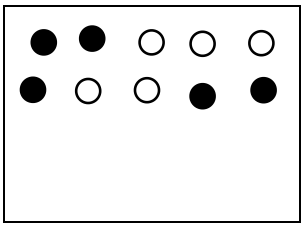
4 A, 6 B

A + B = 10 and B = 1.5A, so 2.5A = 10: A = 4 and B = 6. Check: 6/4 = 1.5

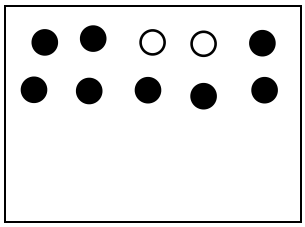
3. Each box shows A ⇌ B at equilibrium. Key: ● = A, ○ = B



Box 1



Box 2



Box 3

(a) Which box has K < 1?

Box 3: K = 2/8 = 0.25

(b) Which box has K = 4.0?

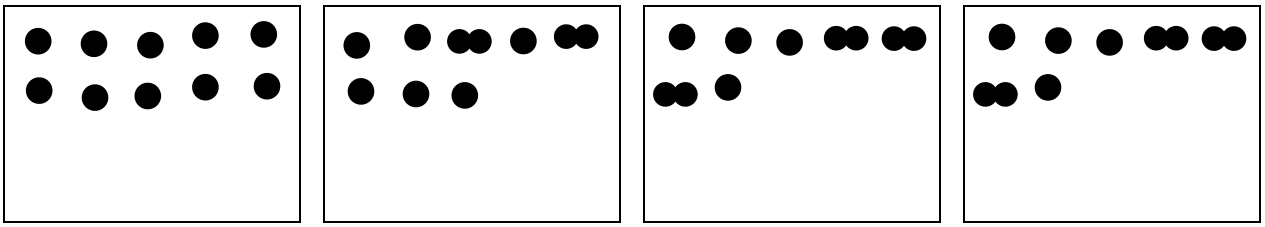
Box 1: K = 8/2 = 4.0

(c) Box 2 has K = 1. What does that mean?

Reactants and products are present in equal amounts.

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4. Snapshots for $2NO_2 \rightleftharpoons N_2O_4$ in a 1.0 L box. ● = one NO_2; ●● pair = one N_2O_4. Each particle is 0.10 mol.



(a) When is equilibrium reached?

By t3, when the counts stop changing.

(b) Show that the number of NO_2 units is the same in every box.

t1: 10. t2: 6 + 2(2) = 10. t3: 4 + 2(3) = 10.

(c) Calculate K_c.

$[NO_2] = 0.40$ M, $[N_2O_4] = 0.30$ M. $K_c = 0.30 / (0.40)^2 = 1.9$

(d) Why can't you use raw counts for K here?

The two sides have different numbers of particles (2 vs 1), so the units don't cancel. Convert to molarity first.

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