ANSWER KEY.

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RICE Tables

Chemistry | ANSWER KEY

Every entry is in M (change moles to M first). Change row: reactants −, products +, and x terms match the coefficients. E = I + C. Solve for x, then plug the E row into K.

1. $N_2O_4 \rightleftharpoons 2NO_2$. A flask starts with 0.200 M N_2O_4 and no NO_2. At equilibrium $[NO_2] = 0.120$ M. Fill in a RICE table and find K.

R	N_2O_4	⇌	$2NO_2$
I	0.200		0
C	−x		+2x
E	0.200 − x = 0.140		2x = 0.120

2x = 0.120, so x = 0.0600

$K = (0.120)^2 / 0.140 = 0.103$

2. $H_2 + I_2 \rightleftharpoons 2HI$. A flask starts with 0.300 M H_2 and 0.300 M I_2. At equilibrium [HI] = 0.400 M. Find K.

R	H_2	+	I_2	⇌	2HI
I	0.300		0.300		0
C	−x		−x		+2x
E	0.100		0.100		0.400

2x = 0.400, so x = 0.200

$K = (0.400)^2 / [(0.100)(0.100)] = 16.0$

3. $2SO_3 \rightleftharpoons 2SO_2 + O_2$. 1.00 mol SO_3 is placed in a 2.00 L flask. At equilibrium there is 0.150 mol O_2. Find K.

Change to M: $[SO_3] = 1.00 \div 2.00 = 0.500$ M; $[O_2] = 0.150 \div 2.00 = 0.0750$ M

R	$2SO_3$	⇌	$2SO_2$	+	O_2
I	0.500		0		0
C	−2x		+2x		+x
E	0.350		0.150		0.0750

x = 0.0750

$K = (0.150)^2(0.0750) / (0.350)^2 = 0.0138$

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4. $CO + H_2O \rightleftharpoons CO_2 + H_2$, K = 4.00. A flask starts with 0.300 M CO and 0.300 M H_2O. Find all equilibrium concentrations. (Hint: take the square root of both sides.)

R	CO	+	H_2O	⇌	CO_2	+	H_2
I	0.300		0.300		0		0
C	−x		−x		+x		+x
E	0.300 − x		0.300 − x		x		x

$4.00 = x^2 / (0.300 - x)^2$, so $2.00 = x / (0.300 - x)$
$0.600 - 2.00x = x$, so $x = 0.200$
$[CO] = [H_2O] = 0.100$ M; $[CO_2] = [H_2] = 0.200$ M

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5. $H_2 + I_2 \rightleftharpoons 2HI$, K = 64.0. A flask starts with 0.500 M H_2 and 0.500 M I_2. Find all equilibrium concentrations.

R	H_2	+	I_2	⇌	2HI
I	0.500		0.500		0
C	−x		−x		+2x
E	0.500 − x		0.500 − x		2x

$64.0 = (2x)^2 / (0.500 - x)^2$, so $8.00 = 2x / (0.500 - x)$
$4.00 - 8.00x = 2x$, so $x = 0.400$
$[H_2] = [I_2] = 0.100$ M; $[HI] = 0.800$ M

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6. In problem 3, a student puts 1.00 and 0.150 straight into the RICE table. What is wrong?

Those are moles. Every RICE entry must be in molarity, so divide by 2.00 L first.

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