CONCEPT: USING HESS'S LAW TO DETERMINE K

- **Recall *Hess's Law*:** ΔH_{rxn} changes _____ to the coefficients of a reaction
  - □ However, relationship between K and the coefficients of a reaction is _____
    - There are ____ possible rearrangements (changes) of a chemical reaction

Rearrangements & Effect on K

2 SO_2 (g) + 1 O_2 (g) $\rightleftharpoons$ 2 SO_3 (g) $K_{original}$ = 71.3

1 Multiplication	2 Reverse	3 Division
□ Multiply Reaction: raise K to same factor - Ex: multiply Rxn by 3; $K_{new} = K^3$ New Rxn: _____ K_{new} = _____	□ Reversing Reaction: inverse of K - Ex: reverse Rxn; $K_{new} = K^{-1}$ New Rxn: _____ K_{new} = _____	□ Divide Reaction: raise K to reciprocal of factor - Ex: divide Rxn by 2; $K_{new} = K^{1/2}$ New Rxn: _____ K_{new} = _____

EXAMPLE: Given the reaction: 2 Cl_2 (g) + 2 H_2O (g) $\rightleftharpoons$ 4 HCl (g) + O_2 (g) Kp = 7.5×10^{-2}, calculate Kp of the reactions below.

a) Cl_2 (g) + H_2O (g) $\rightleftharpoons$ 2 HCl (g) + ½ O_2 (g) _____

b) 4 HCl (g) + O_2 (g) $\rightleftharpoons$ 2 Cl_2 (g) + 2 H_2O (g) _____

c) 16 HCl (g) + 4 O_2 (g) $\rightleftharpoons$ 8 Cl_2 (g) + 8 H_2O (g) _____

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PRACTICE: Kc = 6.5×10^2 at a particular temperature for a reaction: $2\ NO\ (g) + 2\ H_2\ (g) \rightleftharpoons N_2\ (g) + 2\ H_2O\ (g)$. Calculate Kc at same temperature for the following reaction: $1/3\ N_2\ (g) + 2/3\ H_2O\ (g) \rightleftharpoons 2/3\ NO\ (g) + 2/3\ H_2\ (g)$.