

CHEMICAL EQUILIBRIUM WORKSHEET

On the line at the left, write the letter of the description that best matches each term.

- | | | |
|-------|--------------------------------|--|
| _____ | 1. Equilibrium position | a. used to determine if a reaction has reached equilibrium |
| _____ | 2. Law of chemical equilibrium | b. depends on the initial concentrations of the substances in a reaction |
| _____ | 3. Reaction quotient | c. states that every reaction proceeds to an equilibrium state with a specific K_{eq} |
| _____ | 4. Law of mass action | d. expresses the relative concentration of reactants and products at equilibrium in terms of an equilibrium constant |
| _____ | 5. Equilibrium constant | e. the ratio of product concentration to reactant concentration at equilibrium |

Answer each of the following in the space provided

- What is the equilibrium expression for the equation $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$?
- What is the equilibrium expression for the equation $NH_4Cl(s) \rightleftharpoons NH_3(g) + HCl(g)$?
- What is the equilibrium expression for the equation $As_4O_6(s) + 6C(s) \rightleftharpoons As_4(g) + 6CO(g)$?
- What is the equilibrium expression for the equation $SnO_2(s) + 2CO(g) \rightleftharpoons Sn(s) + 2CO_2(g)$?
- What is the equilibrium expression for the equation $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$?
- For the reaction $2CO(g) \rightleftharpoons C(s) + CO_2(g)$, $K_{eq} = 7.7 \times 10^{-15}$. At a particular time, the following concentrations are measured: $[CO]=0.034$ M, $[CO_2] = 3.6 \times 10^{-17}$ M. Is this reaction at equilibrium? If not which direction will the reaction proceed?
- For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, $K_{eq} = 0.2$. At a particular time, the following concentrations are measured: $[N_2O_4]=2.0$ M, $[NO_2] = 0.2$ M. Is this reaction at equilibrium? If not which direction will the reaction proceed?
- For the reaction $2ICl(g) \rightleftharpoons I_2(g) + Cl_2(g)$, $K_{eq} = 0.11$. At a particular time, the following concentrations are measured: $[ICl]=2.5$ M, $[I_2] = 2.0$ M, $[Cl_2]= 1.2$ M. Is this reaction at equilibrium? If not which direction will the reaction proceed?
- At 340°C , $K_{eq} = 0.064$ for the reaction $Fe_2O_3(s) + 3H_2(g) \rightleftharpoons 2Fe(s) + 3H_2O(g)$. Given that $[H_2]=0.45$ M and $[H_2O]=0.37$ M, find Q and predict how the reaction will proceed.

Chemical Equilibrium Expression Answer Key

Charles H. Corwin



Chemical Equilibrium Expression Answer Key:

Introduction to General, Organic, and Biochemistry Morris Hein, Scott Pattison, Susan Arena, Leo R. Best, 2014-01-15 The most comprehensive book available on the subject Introduction to General Organic and Biochemistry 11th Edition continues its tradition of fostering the development of problem solving skills featuring numerous examples and coverage of current applications Skillfully anticipating areas of difficulty and pacing the material accordingly this readable work provides clear and logical explanations of chemical concepts as well as the right mix of general chemistry organic chemistry and biochemistry An emphasis on real world topics lets readers clearly see how the chemistry will apply to their career

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science majors and environmental science majors Use of computer modeling for water and soil chemistry provides students with the models used by practicing environmental chemists Examples and complex problems with worked solutions included throughout the text Examples based on real data provide exposure to the real problems and data students will face in their careers

SourceBook Version 2.1, 1998 **Pollutant Fate and Transport in Environmental Multimedia** Frank M. Dunnivant, Elliot Anders, 2019-03-28 Bridges the gaps between regulatory engineering and science disciplines in order to comprehensively cover pollutant fate and transport in environmental multimedia This book presents and integrates all aspects of fate and transport chemistry modeling various forms of assessment and the environmental legal framework It approaches each of these topics initially from a conceptual perspective before explaining the concepts in terms of the math necessary to model the problem so that students of all levels can learn and eventually contribute to the advancement of water quality science The first third of *Pollutant Fate and Transport in Environmental Multimedia* is dedicated to the relevant aspects of chemistry behind the fate and transport processes It provides relatively simple examples and problems to teach these principles The second third of the book is based on the conceptual derivation and the use of common models to evaluate the importance of model parameters and sensitivity analysis complex equation derivations are given in appendices Computer exercises and available simulators teach and enforce the concepts and logic behind fate and transport modeling The last third of the book is focused on various aspects of assessment toxicology risk benefit cost and life cycle and environmental legislation in the US Europe and China The book closes with a set of laboratory exercises that illustrate chemical and fate and transport concepts covered in the text with example results for most experiments Features more introductory material on past environmental disasters and the continued need to study environmental chemistry and engineering Covers chemical toxicology with various forms of assessment United States European and Chinese regulations and advanced fate and transport modeling and regulatory implications Provides a conceptual and relatively simple mathematical approach to fate and transport modeling yet complex derivations of most equations are given in appendices Integrates the use of numerous software packages pC pH EnviroLab Simulators Water Wastewater and Global Issues and Fate 2016 Contains numerous easy to understand examples and problems along with answers for most end of the chapter problems and simulators for answers to fate and transport questions Includes numerous companion laboratory experiments with EnviroLab Requiring just a basic knowledge of algebra and first year college chemistry to start *Pollutant Fate and Transport in Environmental Multimedia* is an excellent textbook for upper level undergraduate and graduate faculty and students studying environmental engineering and science

Quantitative Chemical Analysis Daniel C. Harris, 2010-04-30 QCA is the bestselling textbook of choice for analytical chemistry It offers a modern portrait of the techniques of chemical analysis backed by a wealth of real world applications This edition features new coverage of spectroscopy and statistics new pedagogy and enhanced lecturer support

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Senoo, Kimihiko Hara, 1994 Pressure like temperature is one of the most important parameters governing the state of matter Today high pressure science and technology is applied to diverse research fields physics chemistry biology earth and marine sciences material science and technology chemical engineering biotechnology and medicine Research on liquids and solutions at high pressure is not only important for elucidating the structure of liquids intermolecular interactions between solutes and solvents and chemical reactions in solutions but also for providing fundamental numerical data for the design of ch **Study Guide for Chemical Principles** Thomas Elliott Taylor, 1979 *British Chemical Abstracts*, 1928

Problems and Solutions for General Chemistry and College Chemistry, Sixth Editions by Nebergall, Holtzclaw, and Robinson Frederick K. Ault, 1980 **Journal of the Chemical Society** Chemical Society (Great Britain), 1901

Quarterly Journal of the Chemical Society of London Chemical Society (Great Britain), 1930 **Chemistry** Steven S. Zumdahl, 1997 **Bulletin of the Chemical Society of Japan** Nihon Kagakkai, 1987 **General Chemistry** Ralph H. Petrucci, William S. Harwood, 1993 General Chemistry Principles and Modern Applications is recognized for its superior problems lucid writing and precision of argument This updated and expanded edition retains the popular and innovative features of previous editions including Feature Problems follow up Integrative and Practice Exercises to accompany every in chapter Example and Focus On application boxes as well as new Keep in Mind marginal notes Topics covered include atoms and the atomic theory chemical compounds and reactions gases Thermochemistry electrons in atoms chemical bonding liquids solids and intermolecular forces chemical kinetics principles of chemical equilibrium acids and bases electrochemistry representative and transitional elements and nuclear and organic chemistry For individuals interested in a broad overview of chemical principles and applications *Fundamentals of Chemistry* David E. Goldberg, 2001 **CHEMISTRY** SILBERBERG, 2003 **Chemical Principles** Richard Earl Dickerson, 1984

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