

② for reaction showing
part (c) and (d)

Worksheet 10: Writing Chemical Equations

Section

- If an equation does not balance, decomposition, single replacement, double replacement reactions predict the products, and then write the balanced equation for the reaction.
- Refer to the periodic table for solubility rules for double replacement reactions and the activity series for single replacement reactions. Then, when writing these reactions, ignore all of the information about acidity or basicity, as many these are general reactions to make complete sentences. (simply put out the chemical formulas)

Examples

State the following reaction equations balanced:

Reaction 1: Zinc reacts with hydrochloric acid: $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

Reaction 2: Zinc reacts with dilute sulfuric acid: $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

1. Zinc reacts with dilute sulfuric acid: $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

2. Zinc reacts with a solution of copper(II) sulfate: $Zn(s) + CuSO_4(aq) \rightarrow Cu(s) + ZnSO_4(aq)$

3. Zinc reacts with dilute sulfuric acid to form zinc(II) sulfate: $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

4. Zinc reacts with dilute sulfuric acid to form zinc(II) sulfate and hydrogen gas: $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

5. Zinc reacts with dilute sulfuric acid to form zinc(II) sulfate and hydrogen gas: $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$

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Single Replacement

Double Replacement

② for reaction showing part (c) and (d)

Reactions of acid with a metal carbonate or bicarbonate

Double Replacement

1. Zinc and sodium carbonate react:

Reaction 1: Zinc reacts with sodium carbonate: $Zn(s) + Na_2CO_3(aq) \rightarrow ZnCO_3(s) + Na_2O(aq)$

Reaction 2: Zinc reacts with sodium bicarbonate: $Zn(s) + NaHCO_3(aq) \rightarrow ZnCO_3(s) + NaH(aq)$

Reaction 3: Zinc reacts with potassium carbonate: $Zn(s) + K_2CO_3(aq) \rightarrow ZnCO_3(s) + KOH(aq)$

Reaction 4: Zinc reacts with potassium bicarbonate: $Zn(s) + KHCO_3(aq) \rightarrow ZnCO_3(s) + KOH(aq)$

Reaction 5: Zinc reacts with barium carbonate: $Zn(s) + BaCO_3(aq) \rightarrow ZnCO_3(s) + BaO(aq)$

Reaction 6: Zinc reacts with barium bicarbonate: $Zn(s) + BaHCO_3(aq) \rightarrow ZnCO_3(s) + BaH(aq)$

Reaction 7: Zinc reacts with calcium carbonate: $Zn(s) + CaCO_3(aq) \rightarrow ZnCO_3(s) + CaO(aq)$

Reaction 8: Zinc reacts with calcium bicarbonate: $Zn(s) + CaHCO_3(aq) \rightarrow ZnCO_3(s) + CaH(aq)$

Reaction 9: Zinc reacts with magnesium carbonate: $Zn(s) + MgCO_3(aq) \rightarrow ZnCO_3(s) + MgO(aq)$

Reaction 10: Zinc reacts with magnesium bicarbonate: $Zn(s) + MgHCO_3(aq) \rightarrow ZnCO_3(s) + MgH(aq)$

Reaction 11: Zinc reacts with ammonium carbonate: $Zn(s) + (NH_4)_2CO_3(aq) \rightarrow ZnCO_3(s) + (NH_4)_2O(aq)$

Reaction 12: Zinc reacts with ammonium bicarbonate: $Zn(s) + NH_4HCO_3(aq) \rightarrow ZnCO_3(s) + NH_4H(aq)$

Reaction 13: Zinc reacts with potassium carbonate: $Zn(s) + K_2CO_3(aq) \rightarrow ZnCO_3(s) + KOH(aq)$

Reaction 14: Zinc reacts with potassium bicarbonate: $Zn(s) + KHCO_3(aq) \rightarrow ZnCO_3(s) + KOH(aq)$

Reaction 15: Zinc reacts with barium carbonate: $Zn(s) + BaCO_3(aq) \rightarrow ZnCO_3(s) + BaO(aq)$

Reaction 16: Zinc reacts with barium bicarbonate: $Zn(s) + BaHCO_3(aq) \rightarrow ZnCO_3(s) + BaH(aq)$

Reaction 17: Zinc reacts with calcium carbonate: $Zn(s) + CaCO_3(aq) \rightarrow ZnCO_3(s) + CaO(aq)$

Reaction 18: Zinc reacts with calcium bicarbonate: $Zn(s) + CaHCO_3(aq) \rightarrow ZnCO_3(s) + CaH(aq)$

Reaction 19: Zinc reacts with magnesium carbonate: $Zn(s) + MgCO_3(aq) \rightarrow ZnCO_3(s) + MgO(aq)$

Reaction 20: Zinc reacts with magnesium bicarbonate: $Zn(s) + MgHCO_3(aq) \rightarrow ZnCO_3(s) + MgH(aq)$

Reaction 21: Zinc reacts with ammonium carbonate: $Zn(s) + (NH_4)_2CO_3(aq) \rightarrow ZnCO_3(s) + (NH_4)_2O(aq)$

Reaction 22: Zinc reacts with ammonium bicarbonate: $Zn(s) + NH_4HCO_3(aq) \rightarrow ZnCO_3(s) + NH_4H(aq)$

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Reactions of acid with a metal carbonate or bicarbonate

Double Replacement

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Hu Zhenqi

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Steps to a 5 AP Environmental Science, 2012-2013 Edition Linda D. Williams, 2011-06-10 A Perfect Plan for the Perfect Score We want you to succeed on your AP exam That's why we've created this 5 step plan to help you study more effectively use your preparation time wisely and get your best score This easy to follow guide offers you a complete review of your AP course strategies to give you the edge on test day and plenty of practice with AP style test questions You'll sharpen your subject knowledge strengthen your thinking skills and build your test taking confidence with Full length practice exams modeled on the real test All the terms and concepts you need to know to get your best score Your choice of three customized study schedules so you can pick the one that meets your needs The 5 Step Plan helps you get the most out of your study time Step 1 Set Up Your Study Program Step 2 Determine Your Readiness Step 3 Develop the Strategies Step 4 Review the Knowledge Step 5 Build Your Confidence Topics include Earth Science Concepts Atmosphere Global Water Resources Soil and Soil Dynamics Ecosystem Structure Natural Cycles and Energy Flow Population Agriculture and Aquaculture Forestry Land Use Energy Nuclear Energy Renewable Energies Pollution Global Change

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reorganize the chapter order to reflect clinical chemistry flow in most courses today Individual chapter content will be based on the ASCLS Entry Level Curriculum A map of how the textbook correlates to the ASCLS curriculum will be provided as an instructor resource Bishop not only demonstrates the how of clinical testing but also the what why and when of testing correlations to help students develop the knowledge and interpretive and analytic skills they will need in their future careers

The Microbial Regulation of Global Biogeochemical Cycles Johannes Rousk, Per Bengtson, 2014-10-17 Global biogeochemical cycles of carbon and nutrients are increasingly affected by human activities So far modeling has been central for our understanding of how this will affect ecosystem functioning and the biogeochemical cycling of carbon and nutrients These models have been forced to adopt a reductive approach built on the flow of carbon and nutrients between pools that are difficult or even impossible to verify with empirical evidence Furthermore while some of these models include the response in physiology ecology and biogeography of primary producers to environmental change the microbial part of the ecosystem is generally poorly represented or lacking altogether The principal pool of carbon and nutrients in soil is the organic matter The turnover of this reservoir is governed by microorganisms that act as catalytic converters of environmental conditions into biogeochemical cycling of carbon and nutrients The dependency of this conversion activity on individual environmental conditions such as pH moisture and temperature has been frequently studied On the contrary only rarely have the microorganisms involved in carrying out the processes been identified and one of the biggest challenges for advancing our understanding of biogeochemical processes is to identify the microorganisms carrying out a specific set of metabolic processes and how they partition their carbon and nutrient use We also need to identify the factors governing these activities and if they result in feedback mechanisms that alter the growth activity and interaction between primary producers and microorganisms By determining how different groups of microorganisms respond to individual environmental conditions by allocating carbon and nutrients to production of biomass CO₂ and other products a mechanistic as well as quantitative understanding of formation and decomposition of organic matter and the production and consumption of greenhouse gases can be achieved In this Research Topic supported by the Swedish research councils programme Biodiversity and Ecosystem Services in a Changing Landscape BECC we intend to promote this alternative framework to address how cycling of carbon and nutrients will be altered in a changing environment from the first principle mechanisms that drive them namely the ecology physiology and biogeography of microorganisms and on up to emerging global biogeochemical patterns This novel and unconventional approach has the potential to generate fresh insights that can open up new horizons and stimulate rapid conceptual development in our basic understanding of the regulating factors for global biogeochemical cycles The vision for the research topic is to facilitate such progress by bringing together leading scientists as proponents of several disciplines By bridging Microbial Ecology and Biogeochemistry connecting microbial activities at the micro scale to carbon fluxes at the ecosystem scale and linking above and belowground ecosystem functioning we can leap

forward from the current understanding of the global biogeochemical cycles

Handbook of Mineral Elements in Food

Miguel de la Guardia, Salvador Garrigues, 2015-05-06

Mineral elements are found in foods and drink of all different types from drinking water through to mothers milk. The search for mineral elements has shown that many trace and ultratrace level elements presented in food are required for a healthy life. By identifying and analysing these elements it is possible to evaluate them for their specific health giving properties and conversely to isolate their less desirable properties with a view to reducing or removing them altogether from some foods. The analysis of mineral elements requires a number of different techniques some methods may be suitable for one food type yet completely unsuited to another. The *Handbook of Mineral Elements in Food* is the first book to bring together the analytical techniques the regulatory and legislative framework and the widest possible range of food types into one comprehensive handbook for food scientists and technologists. Much of the book is based on the authors own data most of which is previously unpublished making the *Handbook of Mineral Elements in Food* a vital and up to the minute reference for food scientists in industry and academia alike. Analytical chemists nutritionists and food policy makers will also find it an invaluable resource. Showcasing contributions from international researchers and constituting a major resource for our future understanding of the topic the *Handbook of Mineral Elements in Food* is an essential reference and should be found wherever food science and technology are researched and taught

Molecular Origins of Brain and Body Geometry

Antonio Lima-de-Faria, 2014-10-07

New concepts arise in science when apparently unrelated fields of knowledge are put together in a coherent way. The recent results in molecular biology allow to explain the emergence of body patterns in animals that before could not be understood by zoologists. There are no fancy curiosities in nature. Every pattern is a product of a molecular cascade originating in genes and a living organism arises from the collaboration of these genes with the outer physical environment. Tropical fishes are as startling in their colors and geometric circles as peacocks. Tortoises are covered with the most regular triangles squares and concentric circles that can be green brown or yellow. Parallel scarlet bands are placed side by side of black ones along the body of snakes. Zebras and giraffes have patterns which are lessons in geometry with their transversal and longitudinal stripes their circles and other geometric figures. Monkeys like the mandrills have a spectacularly colored face scarlet nose with blue parallel flanges and yellow beard. All this geometry turns out to be highly molecular. The genes are many and have been DNA sequenced. Besides they not only deal with the coloration of the body but with the development of the brain and the embryonic process. A precise scenario of molecular events unravels in the vertebrates. It may seem far fetched but the search for the origin of this geometry made it mandatory to study the evolution of matter and the origin of the brain. It turned out that matter from its onset is pervaded by geometry and that the brain is also a prisoner of this ordered construction. Moreover the brain is capable of altering the body geometry and the geometry of the environment changes the brain. Nothing spectacular occurred when the brain arrived in evolution. Not only it came after the eye which had already established itself long ago but it had a modest origin. It started

from sensory cells on the skin that later aggregated into clusters of neurons that formed ganglia. It also became evident that pigment cells that decide the establishment of the body pattern originate from the same cell population as neurons the neural crest cells. This is a most revealing result because it throws light on the power that the brain has to rapidly redirect the coloration of the body and to change its pattern. Recent experiments demonstrate how the brain changes the body geometry at will and within seconds an event that could be hardly conceived earlier. Moreover this change is not accidental it is related to the surrounding environment and is also used as a mating strategy. Chameleons know how to do it as well as flat fishes and octopuses. No one would have dared to think that the brain had its own geometry. How could the external geometry of solids or other figures of our environment be apprehended by neurons if these had no architecture of their own. Astonishing was that the so called simple cells in the neurons of the primary visual cortex responded to a bar of light with an axis of orientation that corresponded to the axis of the cell's receptive field. We tend to consider our brain a reliable organ. But how reliable is it. From the beginning the brain is obliged to transform reality. Brain imagery involves form color motion and sleep. Unintentionally these results led to unexpected philosophical implications. Plato's pivotal concept that forms exist independently of the material world is reversed. Atoms have been considered to be imaginary for 2 000 years but at present they can be photographed one by one with electron microscopes. The reason why geometry has led the way in this inquiry is due to the fact that where there is geometry there is utter simplicity coupled to rigorous order that underlies the phenomenon where it is recognized. Order allows variation but imposes at the same time a canalization that is patent in what we call evolution.

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Sustainability II Syed Shatir A. Syed-Hassan, 2019-03-28 4th International Conference on Global Sustainability and Chemical Engineering ICGSCE 2018 Selected peer reviewed papers from the 4th International Conference on Global Sustainability and Chemical Engineering ICGSCE 2018 September 5 6 2018 Kuala Lumpur Malaysia Land Reclamation in Ecological Fragile Areas Hu Zhenqi, 2017-07-20 Land Reclamation in Ecological Fragile Areas contains the proceedings of the 2nd International Symposium on Land Reclamation and Ecological Restoration LRER 2017 Xi an China 20 23 October 2017 The contributions cover a wide range of topics Mining impact on environment Monitoring prediction and assessment of mining impact on land environment Mining methods and measurements to minimize the land and environment impact Mining and reclamation policies regulations and standard AMD treatment Soil and landscape reconstruction Revegetation and biodiversity protection Subsidence land reclamation and ecological restoration Surface mined land reclamation and ecological restoration Solid wastes management waste dump and tailings pond restoration Case study Abandoned mine land reclamation and ecological restoration Contaminated land remediation Reclaimed land monitoring and evaluation Land reclamation supervision Products and industrialization Education technology transfer and international cooperation of mine land reclamation The Belt and Road Initiative and mine land restoration Land Reclamation in Ecological Fragile Areas will be of interest to engineers scientists consultants government officials and students in this area

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