

Unit Three: Matter Project

Feel free to discuss/work with a partner. However, every writing activity is to be done individually. You must write in your own words. You may not copy definitions word for word, or simply change a few words of a source. **Your writing must reflect your understanding of the topic – thus, you must understand the concept before writing an answer to the question.** For definitions, use *Hebden* and/or a smart phone for assistance.

Part 1) Scientific Vocabulary - *Hebden* pages 41 & 42 are helpful for the next five activities:

1) As an individual, look up the terms **qualitative** and **quantitative** in the *Hebden* glossary, or on a smart phone.

As a class, discuss the definitions of and give examples of **qualitative** and **quantitative** information.

Complete questions #1-3 on pg. 43.

2) With a partner, discuss the difference between an **observation** and an **interpretation**. Give two of your own examples of an **observation** versus an **interpretation**.

Helpful Website: <http://www.emsb.qc.ca/laurenhill/science/obs.html>

3) With a partner, give definitions for, and describe the difference between **property**, **data**, and **description** (use the words quantitative and qualitative somewhere in your definitions).

Choose an object and give an examples of its **property**, **data** and a **description**. A little bit of research may be useful for data.

4) Define and give an example of an **experiment**. For your **experiment** example, state the **hypothesis** of the experiment.

5) Discuss with a partner: What is a **theory**, and how does it differ from a **hypothesis**? What is a **law**, and how does it differ from a **theory**? Give an example of a **scientific theory** and a **scientific law**.

Helpful Website: <http://chemistry.about.com/od/chemistry101/a/lawtheory.htm>

Part 2) Matter - *Hebden* page 44 is helpful for the next three activities:

6) Define **Matter** and give an example of something that is matter, and something that is not.

7) Using *Hebden*, a smart phone, and partner discussion, define **physical property**, **chemical property**, **intensive property**, and **extensive property**.

Useful Website: Physical and Chemical Changes:

<http://www.kentchemistry.com/links/Matter/PhysicalChemicalChanges.htm>

Useful Website: Intensive vs. Extensive Properties:

<http://www.chem.tamu.edu/class/majors/tutorialnotefiles/intext.htm>

8) Pick two substances, and for each list its physical properties, chemical properties, and intensive properties (a smart phone will be useful for assistance). Why can't you list any extensive properties? What equipment would you need to find some extensive properties?

Part 3) States of Matter – *Hebden* pages 45 - 47 are helpful for the next four activities:

9) Describe the differences in energy, particle spacing, and bulk properties (see first website below) for **solids, liquids, and gases**. You must provide diagrams for assistance.

Useful Websites:

<http://www.kentchemistry.com/links/Matter/phases.htm>

http://preparatorychemistry.com/Bishop_Solubility_frames.htm - Click on: Structure of Matter

<http://www.dlt.ncssm.edu/core/c11.htm>

10) **Plasma** is often considered the fourth state of matter. Using your smart phone for research, what is plasma?

11) * **CHALLENGING:** What is the difference between **gas** and **vapour**? Discuss possibilities with a partner, do some research on a smart phone, and/or consult Mr. Quast.

12) Define, very precisely, **melting point** and **boiling point**.

Part 4) Classification of Matter I – *Hebden* pgs 49 & 50 are helpful for the next nine activities.

Useful Website for next three Parts: <https://www.youtube.com/watch?v=D6Zz0daxZ9Y>

13) Using *Hebden* and/or a smart phone, describe what the term **system** means in your own words. Then do the same for the term **phase**.

14) Give an example of a **system**, and list all the **phases** within the system. Then repeat this process for a different system.

15) Using *Hebden* and/or a smart phone, describe the term **particle**. Give three **different** examples of a **particle**.

16) Draw a particle diagram of an **element**, and label an **atom**.

Useful Websites: <http://www.chem.purdue.edu/gchelp/atoms/elements.html>

<http://web.archive.org/web/20090606220206/http://www.teachnet.ie/macalvey/elements.htm>

17) Draw a particle diagram of a **compound**, and label a **molecule**.

Useful website:

<http://web.archive.org/web/20090403082535/http://teachnet.ie/macalvey/compound.htm>

18) ***THINK:** Some **elements** are made up of **molecules**. Find an example of this, and draw a particle diagram of the **element**, and label a **molecule**.

19) Describe clearly, in words, the difference between an **atom** and a **molecule**. Then support with a diagram.

20) Describe clearly, in words, the difference between an **element** and a **compound**. Give an example of an element, and an example of a compound.

21) Define the term **ion**. Give four **different** examples of actual ions.

Part 5) Classification of Matter II – *Hebden* pages 50-52 are helpful for the next 7 activities.

22) Using *Hebden* and/or a smart phone, define (your definition must include the term *phase*) the terms **homogeneous & heterogeneous**. Give two specific examples of things that are homogeneous and two specific examples of heterogeneous.

23) Discuss with a partner, use a smartphone and/or *Hebden* to **clearly**, in your words, explain the difference between a **pure substance** and a **mixture**. Give two **different** examples of a pure substance, an example of a homogeneous mixture, and a heterogeneous mixture.

Useful Website: http://chemsite.lsrhs.net/Intro/Pure_vs_mixtures.html

24) What is another name for a homogeneous mixture? Give an example (different from #23), draw a diagram, and label the parts.

Useful Website: <http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/molvie1.swf>

25) What is another name for a heterogeneous mixture? Give an example (different from #23), draw a diagram, and label the parts.

26) Define **solute** and **solvent**. Label and/or identify the solute(s) and solvent from the examples you've given in questions #23, 24, and 25.

Useful Website: http://www.dlt.ncssm.edu/core/Chapter5-Moles-Molarity-Reaction_Types/Chapter5-Animations/Dissolving_NaCl-Electrolyte.html

27) What does **aqueous** mean? Give two examples of an aqueous solution, and label the solute(s) and solvent.

28) Draw a flowchart similar to the one at the top of page 50 in *Hebden*. Add your own descriptions so that your flowchart would be clear and understandable to a younger person.

Part 6) Phase Changes – *Hebden* pages 59 & 60 are helpful for the next three activities.

29) Describe the difference between a **physical change & chemical change**. Give two examples of each.

30) Read page 60 of *Hebden*. Then construct a **Heating-Cooling Graph** for water, from -10 degrees Celsius to 120 degrees Celsius. Label all parts of the graph similar to the graph on the top of page 60.

Useful Websites: <http://www.kentchemistry.com/links/Matter/HeatingCurve.htm>

<http://www.kentchemistry.com/links/Matter/PhaseChanges.htm> - scroll down to second to last diagram

<http://www.wwnorton.com/college/chemistry/chemistry3/ch/05/chemtours.aspx> - click on 'Heating Curves'

31) Using a smart phone to research melting and boiling points, create a fully labeled **Heating-Cooling Graph** for a different pure substance of your choice.

Part 7) Separation of Mixtures

32) Read *Hebden* pages 53-58 carefully.

Useful Website:

http://www.bbc.co.uk/bitesize/ks3/science/chemical_material_behaviour/compounds_mixtures/activity/

33) Do *Hebden* questions #47 & 53 on page 59. **Note*: research the term **miscible** on a smart phone

34) Read over the **Chromatography Separation Lab** and find a group of 3 to perform the lab. Then collect results and do an individual lab report.