

Topic #2

ENERGY & MATTER

OVERVIEW

OBJECTIVES:

To review basic physical concepts of energy and matter, how they interact, and what it has to do with GLOBAL CHANGE.

Objectives for today's class:

MORE COURSE LOGISTICS

About the eText & Testing process

TODAY'S TOPIC: Matter & Energy –Part I

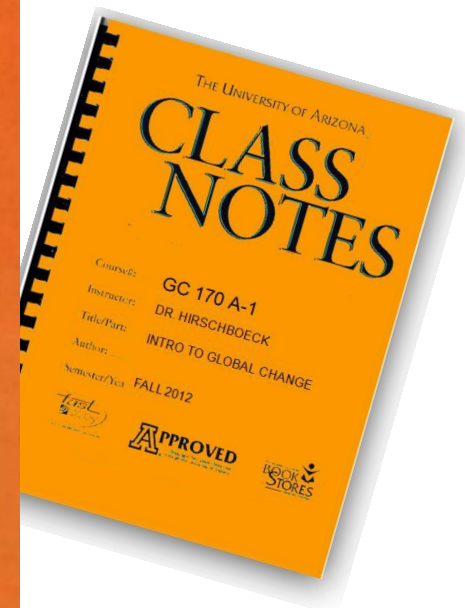
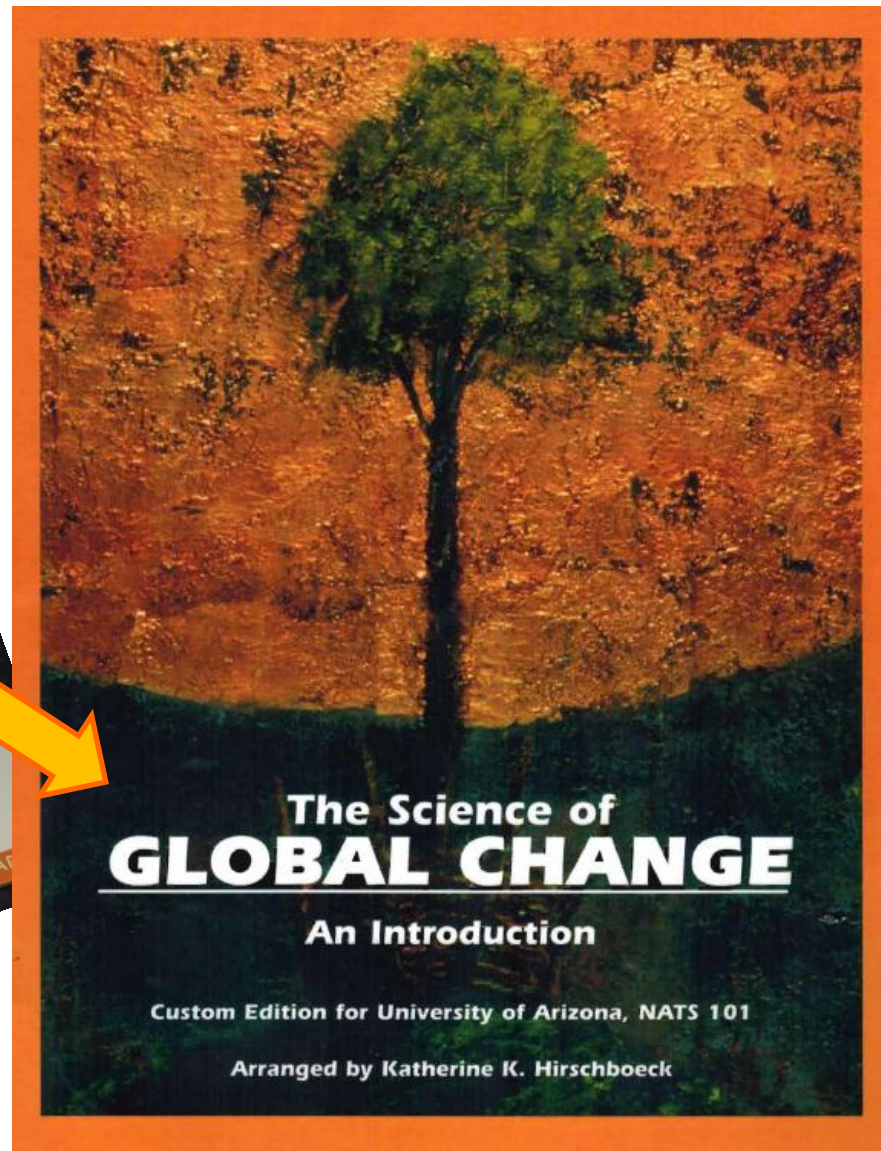
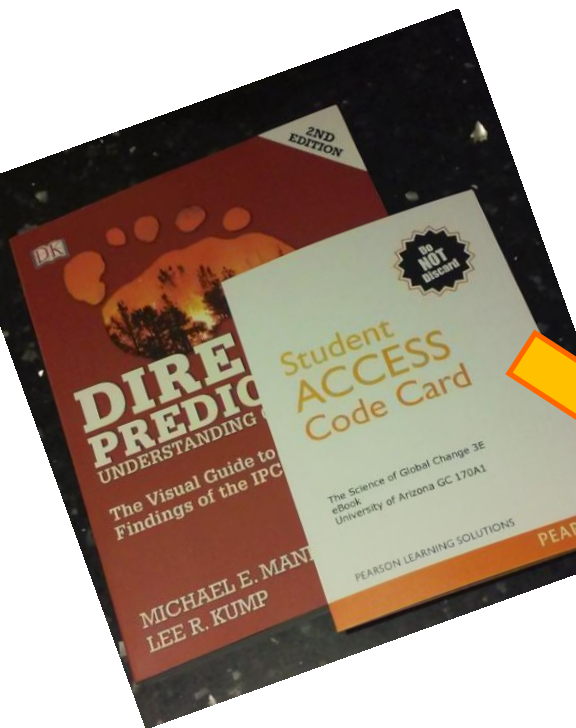
Review of Matter - basic concepts

Periodic Table “Hands On”

Linking the Elements to Global Change

MORE ON COURSE LOGISTICS

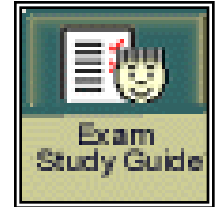
- Demo of **SGC eText**
& what you can do with it
- **Multi-Tiered Testing**
& how it will help you learn



The SGC eText
The main textbook for the class

Multi-Tiered Testing Approach:

Midterm & Final
Individual Exams



In-class Individual &
Group Tests



Online Readiness
Quizzes

**Begin taking
these now!
Practice A + B
then ...
Self Test 1 &
graded RQ-1
(on Chapt 2)**

Ungraded
Self-Tests

**HIGH
STAKES
TESTING**



**LOW
STAKES
TESTING**

Example: **In-class test procedure**

10-questions!

You'll take the test as an individual first . . .



After individual tests are completed . . .

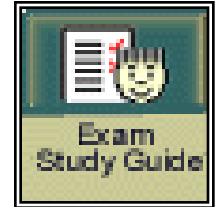
you'll get into your group & take the same test together as a group!



You'll find out your Group Test score right after you take it . . .

Multi-Tiered Testing Approach:

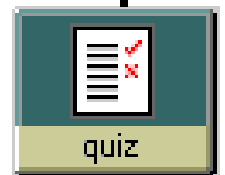
Midterm & Final
Individual Exams



In-class Individual &
Group Tests



Online Readiness
Quizzes



Ungraded
Self-Tests

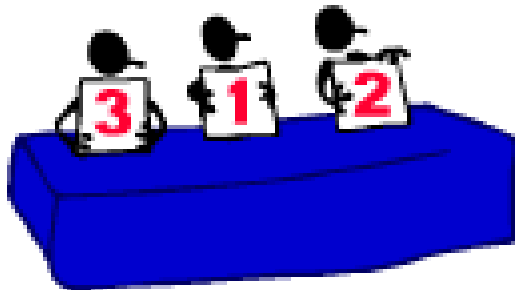
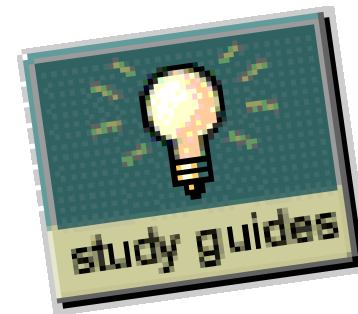


**HIGH
STAKES
TESTING**

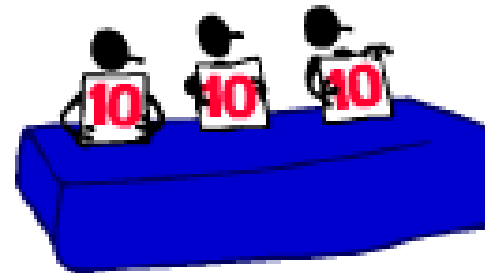


**LOW
STAKES
TESTING**

Taking full advantage of **ALL** the learning tools and resources this course offers offer will give you the best return on your investment

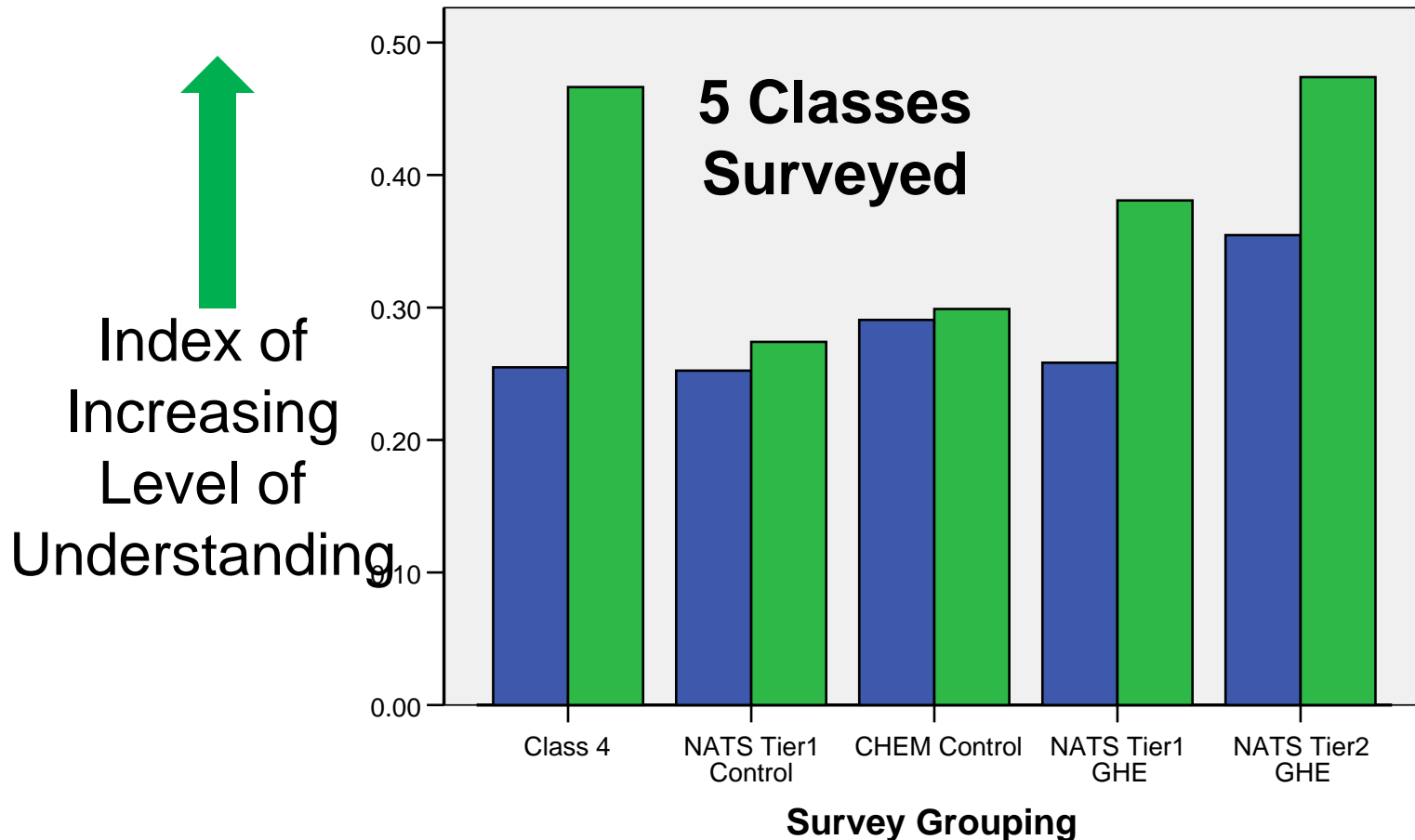


OR




Student Pre & Post-Test Study on : “How well do you understand the science underlying the GREENHOUSE EFFECT?”


 = Start of Semester Scores  = End of Semester Scores



“How well do you understand the science underlying the GREENHOUSE EFFECT?”

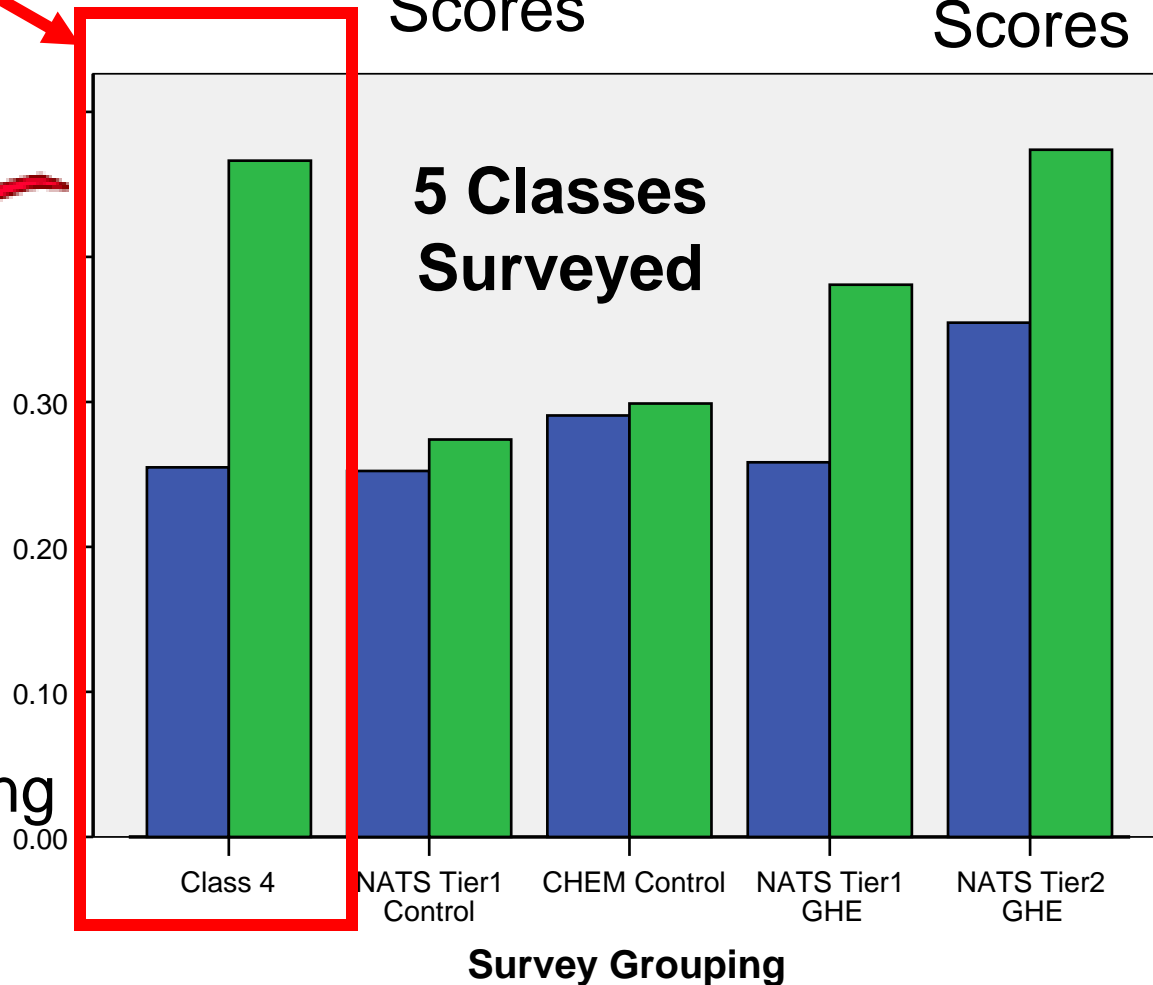
**Dr. H's
GC Class**

 = Start of Semester Scores

 = End of Semester Scores



Index of
Increasing
Level of
Understanding



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OVERVIEW

OBJECTIVES:

To review basic physical concepts of energy and matter, how they interact, and what it has to do with GLOBAL CHANGE.

SCIENCE QUOTE OF THE DAY

*“Science shows us that the visible world is neither **matter** nor **spirit**; the visible world is the **invisible organization of energy.**”*

Heinz R. Pagels (b. 1939)
U.S. Physicist

WHAT IS MATTER?



THINK for a moment about how
YOU would answer this
IN SILENCE!

NOW . . . “try out” your answer with
your group partners.

How similar are you answers?

Matter – some of its attributes:

- Occupies space
- Is perceptible to the senses
- Made up of **atoms**
- Can be in form of
solids, liquids, or gases

Atom:

- “Fundamental building block” of matter
- the smallest ‘representative sample’ of an **element**.

Element:

- made from **a single type of atom**
- can’t be broken down any further (and still maintain its identity)

WHAT ARE ATOMS MADE UP OF?

Nucleus

Electron (-)

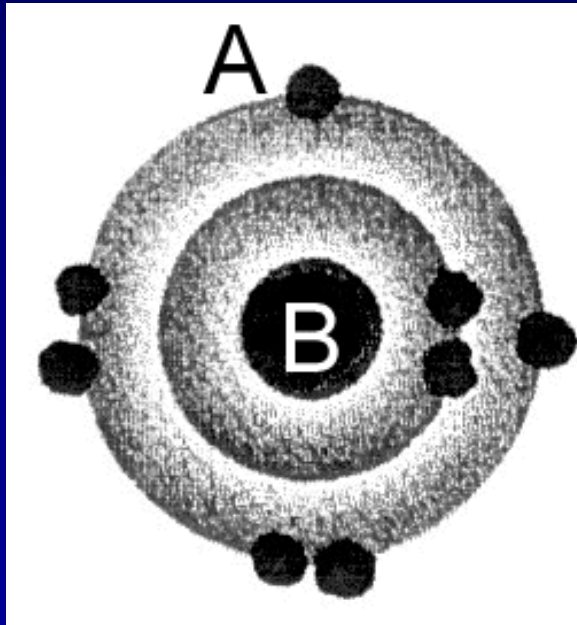
Proton (+)

Neutron ()

MOLECULE ?

two or more atoms
bound together

Schematic “dot” diagram of an oxygen atom



electrons =

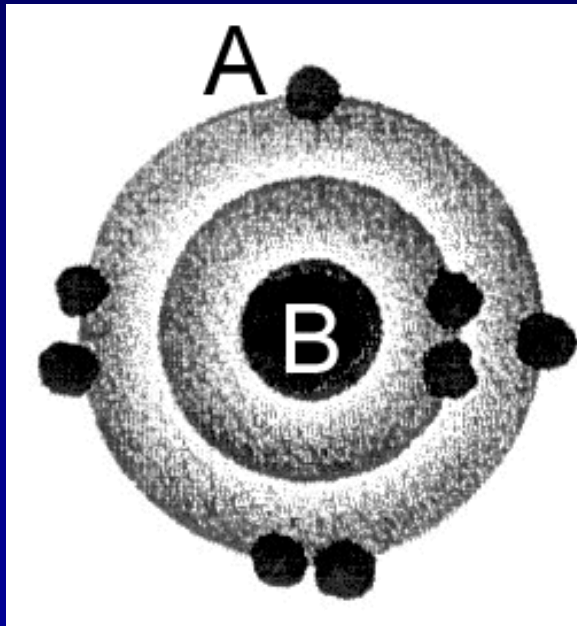
protons =

neutrons =

atomic # =

mass # =

Schematic “dot” diagram of an oxygen atom



electrons = 8

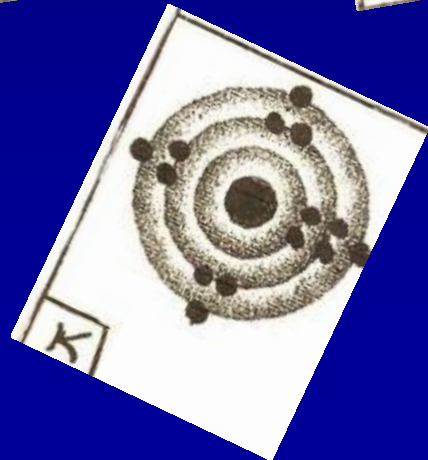
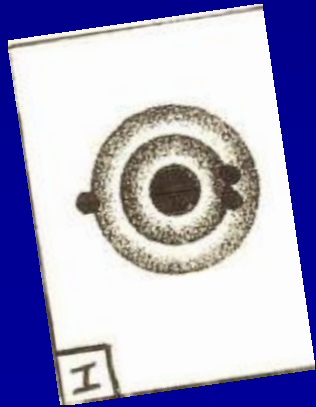
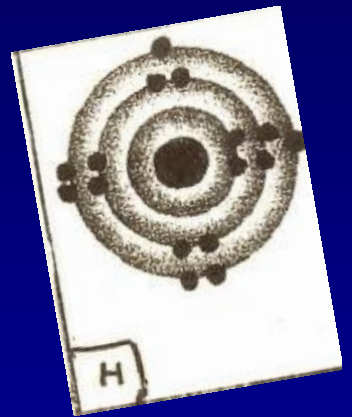
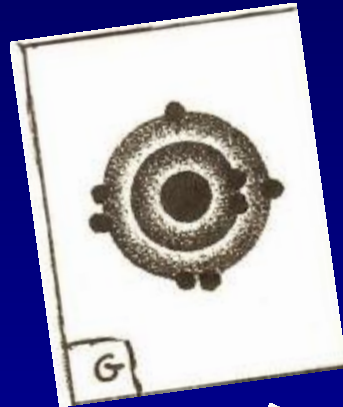
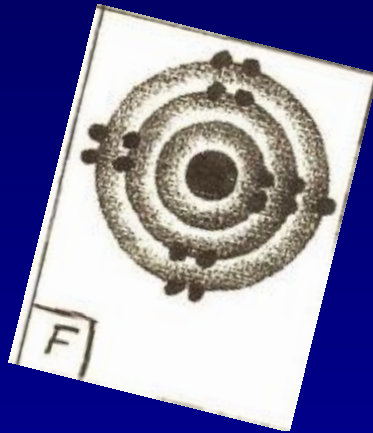
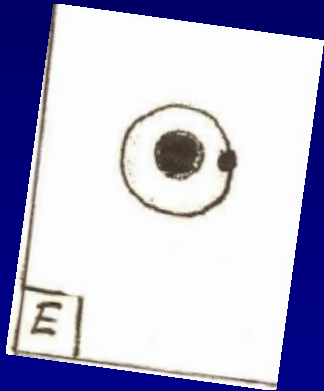
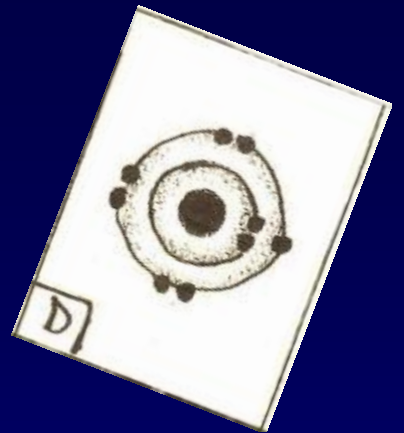
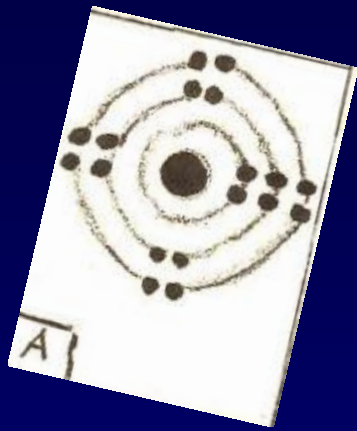
protons = 8

neutrons = 8

atomic # = 8

mass # = 16

GROUP LEARNING ACTIVITY

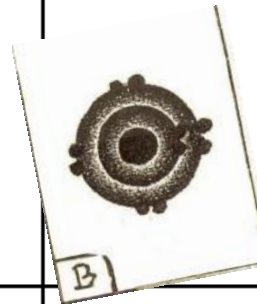
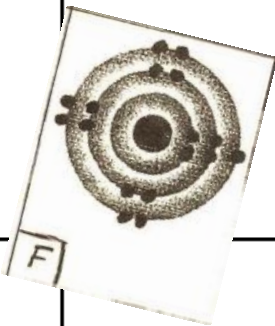


PART A: PERIODIC TABLE REVIEW GROUP ACTIVITY

| Diagram Letter | A | B | C | D | E | F | G | H | I | J | K |
|---------------------------------------|---|----|---|---|---|---|---|---|---|---|---|
| Atomic# for each paper diagram | | 10 | | | | | | | | | |
| Element Symbol for each paper diagram | | Ne | | | | | | | | | |

IN PAIRS OR AS A GROUP:

- **FILL IN: the ATOMIC #'s** (enter Element Symbol LATER)
- **ARRANGE: ATOM DOT DIAGRAMS** on blue layout
- **ANSWER: the Questions on SHEET**
- **WHITEBOARD: DRAW diagrams for 7 missing elements**
- **FILL IN: ELEMENT SYMBOLS**



stop what you're doing and...

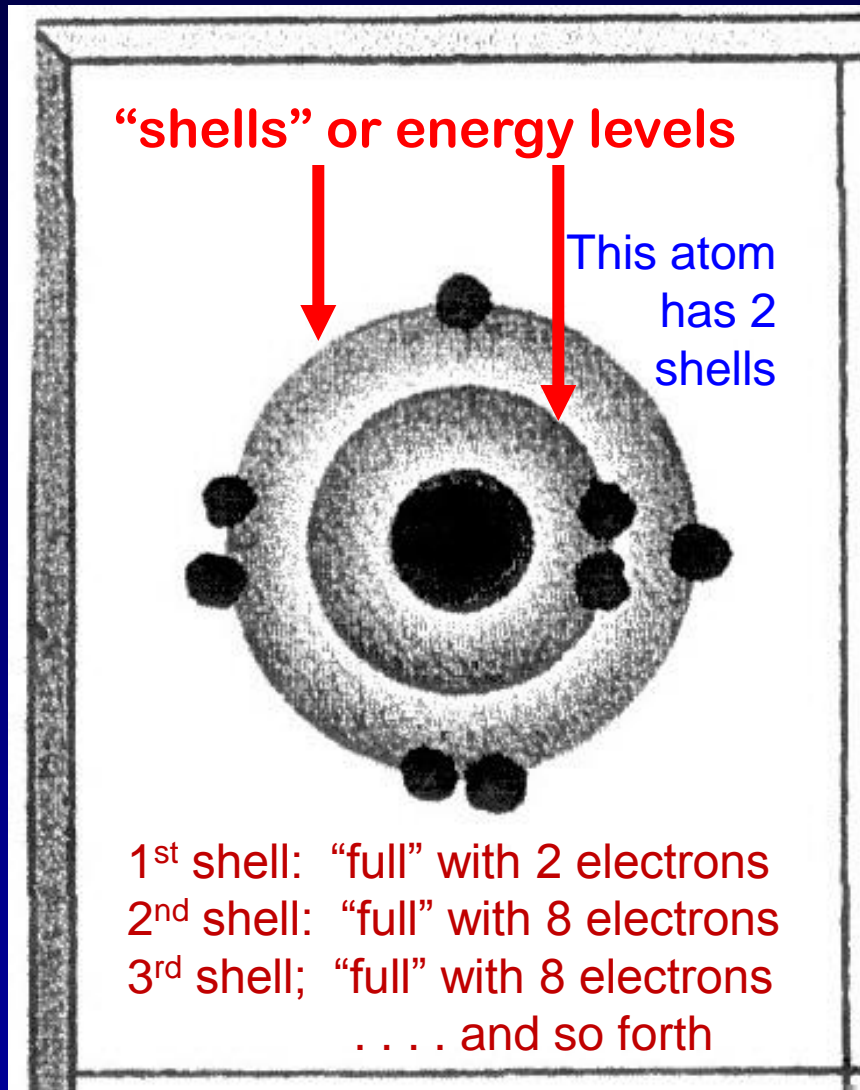
LISTEN.

CLASS “recap” TIME

NO side conversations !

**Please be RESPECTFUL of others
who are speaking to the entire class
or trying to listen**

Electron Configuration in Shells (for Elements 1 to 18)



| Atomic # | Element & Symbol | Number of Electrons in Each Shell | | | Total # of Electrons |
|----------|------------------|-----------------------------------|----------|----------|----------------------|
| | | 1st | 2nd | 3rd | |
| 1 | Hydrogen, H | 1 | | | 1 |
| 2 | Helium, He | 2 (Full) | | | 2 |
| 3 | Lithium, Li | 2 | 1 | | 3 |
| 4 | Beryllium, Be | 2 | 2 | | 4 |
| 5 | Boron, B | 2 | 3 | | 5 |
| 6 | Carbon, C | 2 | 4 | | 6 |
| 7 | Nitrogen, N | 2 | 5 | | 7 |
| 8 | Oxygen, O | 2 | 6 | | 8 |
| 9 | Fluorine, F | 2 | 7 | | 9 |
| 10 | Neon, Ne | 2 | 8 (Full) | | 10 |
| 11 | Sodium, Na | 2 | 8 | 1 | 11 |
| 12 | Magnesium, Mg | 2 | 8 | 2 | 12 |
| 13 | Aluminum, Al | 2 | 8 | 3 | 13 |
| 14 | Silicon, Si | 2 | 8 | 4 | 14 |
| 15 | Phosphorus, P | 2 | 8 | 5 | 15 |
| 16 | Sulfur, S | 2 | 8 | 6 | 16 |
| 17 | Chlorine, Cl | 2 | 8 | 7 | 17 |
| 18 | Argon, Ar | 2 | 8 | 8 (Full) | 18 |

NOTE: This info will all in CLASS NOTES when you get your copy next week!

Periodic Table of the Elements

| | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---------------------------------------|--|--|---------------------------------------|---|---------------------------------------|--|---|--|-------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|--|---|---|---|--|---|---|---|---|--|
| 1 1A | | | | | | | | | | | | | | | | | 18 8A | | | | | | |
| 1 H Hydrogen 1.01 | | | | | | | | | | | | | | | | | 2 He Helium 4.00 | | | | | | |
| 2 Li Lithium 6.94 | 3 Be Beryllium 9.01 | | | | | | | | | | | | | | | | | 13 3A B Boron 10.81 | 14 4A C Carbon 12.01 | 15 5A N Nitrogen 14.01 | 16 6A O Oxygen 16.00 | 17 7A F Fluorine 19.00 | 18 8A Ne Neon 20.18 |
| 3 Na Sodium 22.99 | 4 Mg Magnesium 24.31 | 3 3B | 4 4B | 5 5B | 6 6B | 7 7B | 8 8B | | | 9 9B | 10 10B | 11 1B | 12 2B | 13 3A Al Aluminum 26.98 | 14 4A Si Silicon 28.09 | 15 5A P Phosphorus 30.97 | 16 6A S Sulfur 32.07 | 17 7A Cl Chlorine 35.45 | 18 8A Ar Argon 39.95 | | | | |
| 4 K Potassium 39.10 | 20 Ca Calcium 40.08 | 21 Sc Scandium 44.96 | 22 Ti Titanium 47.87 | 23 V Vanadium 50.94 | 24 Cr Chromium 52.00 | 25 Mn Manganese 54.94 | 26 Fe Iron 55.85 | 27 Co Cobalt 58.93 | 28 Ni Nickel 58.69 | 29 Cu Copper 63.55 | 30 Zn Zinc 65.39 | 31 Ga Gallium 69.72 | 32 Ge Germanium 72.61 | 33 As Arsenic 74.92 | 34 Se Selenium 78.96 | 35 Br Bromine 79.90 | 36 Kr Krypton 83.80 | | | | | | |
| 5 Rb Rubidium 85.47 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.91 | 40 Zr Zirconium 91.22 | 41 Nb Niobium 92.91 | 42 Mo Molybdenum 95.94 | 43 Tc Technetium (98) | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.91 | 46 Pd Palladium 106.42 | 47 Ag Silver 107.87 | 48 Cd Cadmium 112.41 | 49 In Indium 114.82 | 50 Sn Tin 118.71 | 51 Sb Antimony 121.76 | 52 Te Tellurium 127.60 | 53 I Iodine 126.90 | 54 Xe Xenon 131.29 | | | | | | |
| 6 Cs Cesium 132.91 | 56 Ba Barium 137.33 | 57 La Lanthanum 138.91 | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.95 | 74 W Tungsten 183.84 | 75 Re Rhenium 186.21 | 76 Os Osmium 190.23 | 77 Ir Iridium 192.22 | 78 Pt Platinum 195.08 | 79 Au Gold 196.97 | 80 Hg Mercury 200.59 | 81 Tl Thallium 204.38 | 82 Pb Lead 207.2 | 83 Bi Bismuth 208.98 | 84 Po Polonium (209) | 85 At Astatine (210) | 86 Rn Radon (222) | | | | | | |
| 7 Fr Francium (223) | 88 Ra Radium (226) | 89 Ac Actinium (227) | 104 Rf Rutherfordium (261) | 105 Db Dubnium (262) | 106 Sg Seaborgium (266) | 107 Bh Bohrium (264) | 108 Hs Hassium (269) | 109 Mt Meitnerium (268) | | | | | | | | | | | | | | | |

Key

- 11 — Atomic number
- Na** — Element symbol
- Sodium — Element name
- 22.99 — Average atomic mass*

* If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.

| | | | | | | | | | | | | | |
|--------------------------------------|---|--|--|---------------------------------------|---------------------------------------|---|---------------------------------------|---|---|--------------------------------------|--|--|---|
| 58 Ce Cerium 140.12 | 59 Pr Praseodymium 140.91 | 60 Nd Neodymium 144.24 | 61 Pm Promethium (145) | 62 Sm Samarium 150.36 | 63 Eu Europium 151.96 | 64 Gd Gadolinium 157.25 | 65 Tb Terbium 158.93 | 66 Dy Dysprosium 162.50 | 67 Ho Holmium 164.93 | 68 Er Erbium 167.26 | 69 Tm Thulium 168.93 | 70 Yb Ytterbium 173.04 | 71 Lu Lutetium 174.97 |
| 90 Th Thorium 232.04 | 91 Pa Protactinium 231.04 | 92 U Uranium 238.03 | 93 Np Neptunium (237) | 94 Pu Plutonium (244) | 95 Am Americium (243) | 96 Cm Curium (247) | 97 Bk Berkelium (247) | 98 Cf Californium (251) | 99 Es Einsteinium (252) | 100 Fm Fermium (257) | 101 Md Mendelevium (258) | 102 No Nobelium (259) | 103 Lr Lawrencium (262) |

GROUP LEARNING ACTIVITY

PART B: MAKING MOLECULES

1) Based on PART A, fill in the element name, symbols, and atomic #s for the first 3 rows in their proper arrangement of the periodic table:

COPY: Name, Symbol & Atomic # onto this table
so you have a simple 3-Row table to work with
WHITEBOARD: combine atoms in the simple table
to MAKE MOLECULES related to Global Change
SELECT SPEAKER: to explain GC connection

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| COPY: Name, Symbol & Atomic # onto this table so you have a simple 3-Row table to work with WHITEBOARD: combine atoms in the simple table to MAKE MOLECULES related to Global Change SELECT SPEAKER: to explain GC connection | | | | | | | |
| | | | | | | | |
| | | | | | | | |

BONUS (if you finish early): write out simple CHEMICAL REACTION with molecules on WHITE BOARD

stop what you're doing and...

LISTEN.

CLASS “recap” TIME

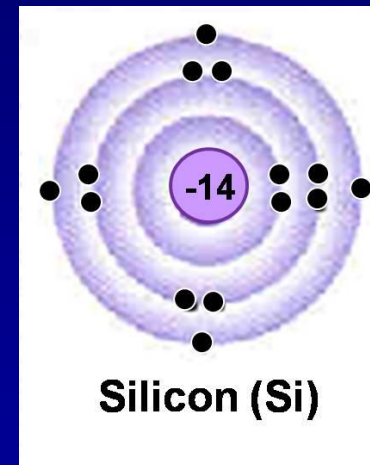
NO side conversations !

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or trying to listen**

PRESENTING A New Feature: The SUSTAINABILITY SEGMENT!!!



Staring:
The **SUN**
&



<http://www.pbs.org/wgbh/nova/solar/>

What did we learn today?

- 1. SGC eText & Testing explained**
- 2. Review of basic concepts of Matter, Atoms, Molecules, etc.**
- 3. Basis for the structure of the Periodic Table:
Rows = same # of shells
Columns = same #of electrons in
outermost shell**
- 4. Important Molecules related to many aspects
of Global Climate Change**

REMEMBER FOR NEXT MONDAY:

- 1) Purchase & Register your SGC eText this week & READ: Chapter 1 Global Change & Chapter 2 Atoms
- 2) Bring your Clicker Device to class NEXT week
- 3) Complete practice Self Tests & Readiness Quizzes (RQ)
- 4) Your first GRADED RQ (RQ-1) on SGC Chapt 2 “ATOMS” is due **MONDAY Aug 31ST** by 1:30 pm
(NOTE: All RQ’s are due 30 minutes before class begins.)

**SEE YOU ON
MONDAY!**