**Homework #1: Chemistry 1013 Spring 2015**

**Due Wednesday 4 February in class 15 pts**

**Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 pt**

1. Order the masses of the particles below from lightest to heaviest (listed left to right):
2. **neutron b) helium atom c) water molecule d) electron**

**LIGHTEST \_\_\_\_\_ < \_\_\_\_\_\_ < \_\_\_\_\_\_< \_\_\_\_\_\_\_ HEAVIEST**

1. If an orange has a diameter of 3 inches and we assign it to be the nucleus of an atom

how many miles away do we expect the orbit of the electrons to begin ? (show work or no credit) 2 pts

1. Fill in the missing information about the elements below: (2 pts/line)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Atomic # | Element symbol | Mass  Number | # protons | # neutrons | # electrons | Net  charge |
| 20 |  |  |  | 12 |  | 0 |
|  | Sn | 120 |  |  |  | 0 |
|  |  | 78 |  | 45 | 36 |  |

4a) The volume, V, of a sphere follows the recipe: V= 4 πr3/3, where r is the radius of the sphere.

Given that the radius of a nucleus is about 10-15 m and radius of an electron orbit is about 10-10m

compute the ratio Ve/Vn of the electron orbit volume Ve to the nuclear volume Vn. (2 pts. show

work or no credit)

Ve/Vn=\_\_\_\_\_\_\_\_\_\_\_

4b) The mass mp of the proton in Hydrogen atoms is 1.66\*10-24  grams. What is the density dp of a

proton if it obeys the formula: dp = mp/Vn g/m3 (2 pts. show work or no credit)

dp = mp/Vn =\_\_\_\_\_\_\_\_\_\_

4c) Which object below most closely matches the proton’s density? (circle answer) 1 pt

**neutron star Sun lead water**

~1.5\*1021 ~1.6\*108  1.2\*107 1\*106 g/m3