BRADFORD COLLEGE

**CHEMISTRY TEST ATOMIC STRUCTURE 2014**

STUDENT NAME :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Marks: /40

1. What are the states of the following substances at 250 Celsius? [4]

Nitrogen\_\_\_\_\_\_\_\_\_\_\_\_

Copper\_\_\_\_\_\_\_\_\_\_\_\_\_

Mercury \_\_\_\_\_\_\_\_\_\_\_\_

Table salt\_\_\_\_\_\_\_\_\_\_\_

1. Name the changes of states. [4]

Example: Water turns to ice: *solidification*

Boil liquid water and water steam forms\_\_\_\_\_\_\_\_\_\_\_

Dry ice turns to carbon dioxide gas \_\_\_\_\_\_\_\_\_\_\_\_\_

Ice-cream left outside \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Early in the morning, water droplets form on a window \_\_\_\_\_\_\_\_\_

1. Solid and liquid density comparison
	1. Draw a diagram of the arrangement of the particles in solid. [1]
	2. Draw a diagram of the arrangement of the particles in liquid. [1]
	3. Use your diagrams above to explain why substances in the solid state are usually heavier than the same substance in the liquid state. [1]
2. Classify each of the following as an element, compound or mixture. [3]

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| --- | --- |
| blood | ethanol  |
| sulphur | a cup of tea |
| ammonia | zirconium |

1. List one similarity and one difference between a compound and a mixture. [2]

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1. The combustion of propane in air produces carbon dioxide and water.
	1. Balance the combustion equation. [2]



* 1. State which law is used to balance the equation above. [1]

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1. Complete the following table. [7]

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| --- | --- | --- | --- | --- | --- |
| **SYMBOL** | **ATOMIC NUMBER** | **MASS NUMBER** | **PROTONS** | **NEUTRONS** | **ELECTRONS** |
|  | 14 | 28 |  |  | 14 |
| Cs+ |  | 133 |  |  |  |
| Po |  | 209 |  |  |  |
|  |  |  | 53 | 74 | 54 |

1. Bromine has two stable isotopes with mass numbers of 79 and 81.
	1. Write down the symbols for the two isotopes including the proper subscripts and superscripts. [1]

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* 1. List one similarity and one difference between the two.( hint: properties, subatomic numbers) [2]

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1. For Molybdenum, a student proposed that the electronic figuration is:

 1s22s22p63s23p64s23d104p65S14d5

1. Draw the spin diagram for molybdenum.[1]
2. This electronic configuration does not make sense according to a principle. State the name of that principle. [1]

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1. Give one reason why Molybdenum adopts 5S14d5 instead of 5S24d4. [1]

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1. Write down the electronic configuration and draw spin diagrams for the following atoms and ions. [8]
	1. Ca2+
	2. Aluminium
	3. Bromide ion
	4. Mercury

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|  |

PERIODIC TABLE OF ELEMENTS

↓PERIOD

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 |  |  |  |  |  |  |  |  |  |  | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 | 1 H Hydrogen1.008 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2HeHelium4.003 |
| 2 | 3 Li Lithium6.941 | 4 BeBeryllium9.012 |  |  |  | ← GROUP → |  |  |  |  |  | 5BBoron10.811 | 6CCarbon12.011 | 7NNitrogen14.007 | 8OOxygen15.999 | 9FFluorine18.998 | 10NeNeon20.180 |
| 3 | 11 NaSodium22.990 | 12MgMagnesium24.305 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13AlAluminium26.982 | 14SiSilicon28.086 | 15PPhosphorus30.974 | 16SSulphur32.065 | 17ClChlorine35.453 | 18ArArgon39.948 |
| 4 | 19 KPotassium39.098 | 20 CaCalcium40.078 | 21 ScScandium44.956 | 22 TiTitanium47.867 | 23 VVanadium50.942 | 24 CrChromium51.996 | 25MnManganese54.938 | 26 FeIron55.845 | 27CoCobalt58.933 | 28 NiNickel58.693 | 29CuCopper63.546 | 30ZnZinc65.380 | 31GaGallium69.723 | 32GeGermanium72.640 | 33AsArsenic74.922 | 34SeSelenium78.960 | 35BrBromine79.904 | 36KrKrypton83.798 |
| 5 | 37 RbRubidium85.468 | 38 SrStrontium87.620 | 39 YYtrium88.906 | 40ZrZirconium91.224 | 41 NbNiobium92.906 | 42MoMolybdenum95.940 | 43TcTechnetium98.91 | 44RuRuthenium101.070 | 45RhRhodium102.906 | 46PdPalladium106.42 | 47AgSilver107.870 | 48CdCadmium112.411 | 49InIndium114.428 | 50SnTin118.710 | 51SbAntimony121.760 | 52TeTellurium127.600 | 53IIodine126.904 | 54XeXenon131.293 |
| 6 | 55 CsCaesium132.905 | 56 BaBarium137.327 | 71LuLutetium174.967 | 72HfHafnium178.490 | 73TaTantalum180.948 | 74WTungsten183.840 | 75ReRhenium186.207 | 76OsOsmium190.230 | 77IrIridium192.217 | 78PtPlatinum195.064 | 79AuGold196.967 | 80HgMercury200.590 | 81TlThallium204.383 | 82PbLead207.200 | 83BiBismuth208.980 | 84PoPolonium(209) | 85AtAstatine(210) | 86RnRadon(222) |
| 7 | 87 FrFrancium(223) | 88RaRadium226.030 | 103LrLawrencium262.100 | 104RfRutherfordium(267) | 105DbDubnium(268) | 106SgSeaborgium(271) | 107BhBohrium(272) | 108 HsHassium(269) | 109MtMeitnerium(268) | 110DsDarmstadium(271) | 111RgRoentgenium(280) | 112UubUnunbium(285) | 113UutUnuntrium(284) | 114UuqUnunquadium(289) | 115UupUnunpentium(288) | 116UuhUnunhexium(293) | 117UusUnunseptium | 118UuoUnunoctium(294) |
|  | KEY |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **57****La****Lanthanum****133.905** | **Atomic** **Number****Symbol****Name** **Relative** **atomic mass** | 57 LaLanthanum138.905 | 58CeCerium140.116 | 59PrPraseodymium140.908 | 60NdNeodymium144.242 | 61PmPromethium(145) | 62SmSamarium150.360 | 63EuEuropium151.964 | 64GdGadolinium157.250 | 65TbTerbium158.925 | 66DyDysprosium162.500 | 67HoHolmium164.930 | 68ErErbium167.259 | 69TmThulium168.934 | 70YbYtterbium173.054 |  |  |
|  | **metalloids** |  | 89 AcActinium(227) | 90ThThorium232.038 | 91PaProtactinium231.036 | 92UUranium238.029 | 93NpNeptunium(237) | 94PuPlutonium(244) | 95AmAmericium(2443) | 96CmCurium(247) | 97BkBerkelium(247) | 98CfCalifornium(251) | 99EsEinsteinium(252) | 100FmFermium(257) | 101MdMendelevium(258) | 102NoNobelium(259) |  |  |