Chemistry induction tasks 1: Physical Chemistry.

Note: I'm setting plenty of AS-standard work for you to complete. You won't be able to do anything like all of it in the induction week, the intention is that you will 'dip your toes' during this week, and use the assigned tasks to get a flavour of the range and difficulty of the course.

Making sure that Chemistry, and especially the course and style of teaching offered at this school, is right for you is very important.

Due to 'lockdown' I am not able to show you the style we will be using – a summary would be:

- Pitched to attain high – end outcomes, using the required A2 standard from the very beginning of the course;
- Heavy practical bias using 'ideas and evidence' approach;
- High expectations of student autonomy and developing study skills (unsuited to 'rote' learners);
- Suiting 'active' learners who like to get stuck in in lessons, arguing and discussing with each other, contributing and challenging ideas.

Before you do anything else read the document entitled 'Chemistry course information'.

Tasks part 1:

Aim to do about 2 hours work and then submit an image (or images) of what you accomplished in the time.

IMPORTANT: All work should be self-assessed according to the following rules:

- **Underline correct parts of work/responses in green; do NOT just tick somewhere on the page;**
- **Add essential words and phrases, also in green, to show development;**
- **Circle / cross out incorrect responses in red. Try to be specific about what was wrong and why.**

Work to complete:

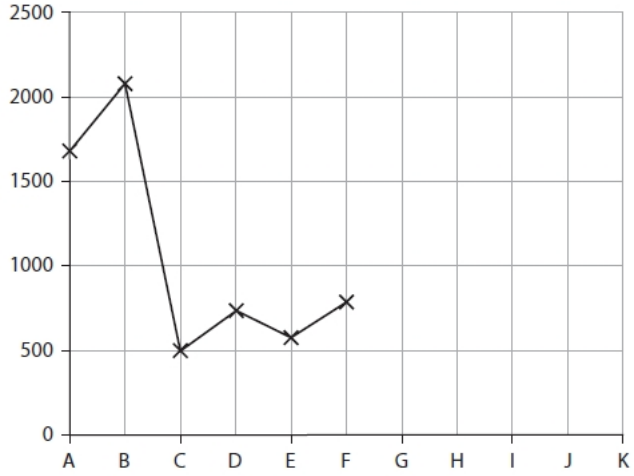
1) Chemistry factsheet 1 – required for induction:
    a. Review work on pp1 (which is just GCSE). No need to write anything
    b. Now from pp2-5 make some notes on ionisation energy (you can ignore the 'inset' about the mass spectrometer if you like, for now). Use the subheadings from the factsheet and watch these videos to help you:
        i. https://www.youtube.com/watch?v=UXddr3WtyyA
        ii. https://www.youtube.com/watch?v=NTH9J_hlAVI
        iii. https://www.youtube.com/watch?v=1O-Bulf7Zqs
        iv. https://www.youtube.com/watch?v=eBLJLD2D5ao
    c. Next, try the relevant factsheet questions and self-assess them (using the guidance given above) as evidence of improvement.
    d. Now, lets try a 'real' exam question – on the following page.
    e. Submit your IMPROVED, assessed answers to this exam question (one page) as part of your evidence bundle.

Electrons in atoms occupy orbitals.

(i) The graph shows the first ionisation energies for a series of six consecutive elements **A**–**F**. The letters are not their chemical symbols.

Complete the graph of the first ionisation energies for the next five elements.

(3)



(ii) Explain why the value of the first ionisation energy for **D** is **greater** than for **C**.

(2)

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(iii) Explain why the value of the first ionisation energy of **E** is **less** than for **D**.

(2)

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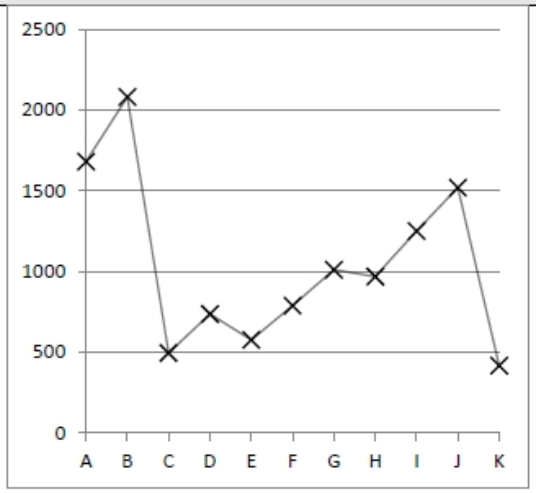
(Total for question = 7 marks)

Mark Scheme

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	 G above F AND H between G and F **(1)** I above H and below A AND J above I and below B **(1)** K below C **(1)**	Points which are not joined with lines are perfectly acceptable. Do not penalise I below G if MP1 not awarded	**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to the following points: • D has one more proton / has a higher nuclear charge **(1)** • the electron being removed in C and D are from the same subshell / s-subshell / (s) orbital **(1)**	 Allow same shell / energy level Allow the electron in D is closer to the nucleus than C / atomic radius decreases Ignore references to shielding, and full s-orbital which is more stable.	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
(iii)	An explanation that makes reference to the following points: • (the electron being removed from E) is from a new subshell / p-subshell / p-orbital **(1)** • which is more shielded from the nucleus than the s-subshell (from which the electron is removed in D) OR • which is further from the nucleus than the s-subshell / orbital (in E) **(1)**	Do not award 'in a new quantum shell' Allow electron removed from a higher energy level. Do not award clear reference to the outer electron in E being further from the nucleus than outer electron in D/atomic radius increasing from D to E Do not award clear reference to the outer electron in E being further from the nucleus than outer electron in D/atomic radius increasing from D to E	**(2)**

Further work (not required for induction but a very good idea to speed your progression over the summer)

Tasks:

- Use a similar structure to the task I set out earlier in the document.
- There is no need to submit any of this to me.
- Base your 'physical chemistry' work on the factsheets 5,6,4 (in that order)
- The home page for the 'free science lessons' is https://www.youtube.com/channel/UCqbOeHaAUXw9Il7sBVG3_bw/videos where you can find almost any subject covered in a simple, plain way.

Important:

- If you are finding 'jumping in at the deep end' difficult, don't be surprised!
- These factsheets together cover about all of the first term's teaching, and will all be re-taught. You are giving yourself an excellent head-start by attempting them now.
- However, to be clear, this IS the level you have to work at from day 1 in September (though with a LOT more teacher guidance, of course!)
- In summary, the induction shows the initial level of challenge, but without the support.