

## FEWEST WORDS IN REARRANGED ALPHABETS

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Unless one is dealing with a relatively large dictionary, it is not difficult to rearrange the alphabet so that no four-letter heterograms (words with no repeated letters) can be read off in order. However, it appears impossible to achieve this for three-letter heterograms for even a small dictionary. The purpose of this article is to exhibit an alphabetic rearrangement (not unique) that minimizes the number of three-letter Official Scrabble Players Dictionary heterograms.

To minimize, it is necessary to place vowels at the head of the list; the OSPD contains 22 heterograms starting with two vowels (aid, ail, aim, ain, air, ais, ait, auk, ear, eat, eau, eon, ion, oaf, oak, oar, oat, oes, oil, oud, our, out), but 67 ending with two vowels. In fact, the vowel arrangement UIAOE blocks all three-letter heterograms in the OSPD but ION and OES; no other vowel arrangement is as good as this.

One cannot place Y ahead of any vowel because several heterograms will be generated thereby. If it is placed at the end of the vowel sequence, one additional word appears: AYS.

All OSPD words with one vowel followed by two different consonants are given below.

abs act ads adz alb alp amp and ant apt arf ark arm ars art ash ask asp awl awn  
edh eft eld elf elk elm els ems end eng ens erg ers ern eth  
ich ick ids ifs ilk imp ink ins irk ism its  
ods oft ohs old oms ons ops opt orc ors owl own  
ugh ump uns ups urb urd urn uts

It is important to place S after K and H (generating OHS but eliminating ASK and ASH); however, S must come before P (generating ASP but eliminating OPS and UPS). Similarly, P must be placed before M (generating ISM but eliminating UMP and AMP). And finally, T must be placed between S and P (if T comes before S, UTS and ITS are generated, and if T comes after P, OPT and APT are generated). The other consonants can be readily assigned without additional heterograms being generated. A final arrangement, which generates the six heterograms ION, OES, AYS, ISM, ASP and OHS, is UIAOEYJQXZVHKSTPDGBMFCNRLW; however, an arrangement generating only five appears impossible to achieve. No four-letter heterograms in the OSPD are generated.

If the dictionary is smaller, one can do better. The May 1974 Word Ways noted that the alphabetic rearrangement UAOEYJQXVGMHKTPSZDBFCNRLWI, which moved I to the end of the sequence, generated a single heterogram, OBI, in the Merriam-Webster Pocket Dictionary. If I stays between U and A instead, the sequence generates ION and ITS. (Plurals of Pocket Dictionary heterograms, such as AYS and UPS, were not considered, but they can be dealt with by modest rearrangement of the letters.) However, the I-at-the-end strategy cannot be used for OSPD heterograms; one eliminates ISM and ION but adds OBI, ANI and SRI in their place.