

Biobeads - Modelling Plasmids with Beads

Instructions for Making ABE Plasmids Using Beads and Magnetic Jewelry Fasteners

To make the plasmids usable for Labs 3 & 4, you will need 2 of each plasmid.

Materials (all are available in kits or individually on Amazon/Temu) to make 2 of each Plasmid

Approximately 100 cm (40 inches) of gold or silver Beading Wire (0.45mm)

- Crimping Pliers
- Tweezers
- 132 x white or grey beads
- 14 x red beads
- 4 x green beads
- 8 x silver magnetic fasteners
- 8 x gold magnetic fasteners
- 16 x crimp beads

pKAN-R Plasmids (to make 2):

rfp/ BAD fragment

- 14 x 6mm red beads
- 2 x 6mm white or grey beads
- 4 x 6mm green beads
- 2 x sets silver magnetic fasteners (HindIII sticky ends)
- 2 sets x gold magnetic fasteners (BamHI sticky ends)
- 4 x crimp tube beads

pKAN fragment

- 16 x 6mm yellow beads
- 78 x 6mm white or grey beads
- 2 x sets silver magnetic fasteners (HindIII sticky ends)
- 2 sets x gold magnetic fasteners (BamHI sticky ends)
- 4 x crimp tube beads

pARA Plasmids (to make 2):

Fragment

- 8 x 6mm white or grey beads
- 2 x sets silver magnetic fasteners (HindIII sticky ends)
- 2 sets x gold magnetic fasteners (BamHI sticky ends)
- 4 x crimp tube beads

pARA fragment

- 18 x 6mm light blue beads
- 12 x 6mm black beads
- 18 x 6mm dark blue beads
- 44 x 6mm white or grey beads
- 2 x sets silver magnetic fasteners (HindIII sticky ends)
- 2 sets x gold magnetic fasteners (BamHI sticky ends)
- 4 x crimp tube beads



Instructions:

There are many instructional videos for this on YouTube—below is a basic outline. The following video shows how to use the crimp beads and magnetic fasteners (crimp covers are not needed). [Tips for Beading and Crimping with a Magnetic Clasp](#)

1. Cut a length of beading wire that is longer than the length (this will depend on which fragment you are making—allow at least an extra 10cm (4 inches), accounting for the crimp beads and clasp
2. Slide a crimp bead onto the end of the wire
3. Thread a magnetic clasp onto the wire
4. Go back through the crimp bead and leave an overhang of about 1cm (½ inch) so the magnetic fastener is secured
5. Crimp the crimp bead using the crimping pliers
6. Thread your desired beads onto the wire as shown in the picture above, leaving enough space at the end for the other magnetic fastener
7. Add another crimp bead at the end
8. Slide the magnetic fastener onto the wire, then feed the wire back through the crimp bead
9. Adjust the size of the loop by sliding the crimp bead up or down the wire
10. Use the crimping pliers to flatten the crimp bead securely (you can add 2 crimp beads at each end for added security)
11. Cut off any excess wire, leaving a small amount for the other end
12. Repeat for other fragments—ensure that the magnetic fasteners are in matching pairs otherwise they won't join!

Amazon USA Links for Supplies - *these are some suggestions only*

- [Magnetic Clasps](#) or [Magnetic Clasps Option #2](#) - Approximate Cost \$5–\$6 per set of 4 plasmids
- [Crimp Beads/Wire/Crimping Pliers](#) - Approximate cost \$10 total
- [White Beads x 1000](#) - Approximate cost \$8
- [Coloured Beads](#) - Set of 1400 beads approximately \$10

Total Cost around \$100-\$150 depending on the cost of the magnetic fasteners to make 15 sets of 4 plasmids

Suggested Student Activities

1. Students can construct all the ligation products given the following rules:
 - Attach only “gold” to “gold” sticky ends.
 - Attach only “silver” to “silver” sticky ends.
 - Only 2 fragments can be attached to each other.
2. Plasmids & fragments can be used after the gel electrophoresis of the ligation products to help students to understand the movement of the fragments and the size of the bands in the gel.
3. Plasmids can be manipulated to show supercoiled, nicked and linear plasmid configurations.