**Supplementary material S2**

**Calculations on:**

1. **Mass of BAG per sample (mBAG/sample)**
2. **Volume the BAG occupies per sample (VBAG/sample)**
3. **Amount of particles per each condition (GG/BAG wt%)**

**For instance :**

**VBAG Vsample , % calculated (mm3**/ **mm3) for 50/50wt% GG/BAG:**

**Input values:**

for mBAG in sample

Vsample = 0.65 ml

Vbatch = 4.5 ml

C(Gellan Gum) = 5mg/ml

for VBAG/Vsample

diameter of sample **(dsample) = 6.65 mm**

height of sample **(hsample)** **= 11.49 mm**

density of bioactive glass\* **(ÞBAG) = 2.6 g/sm3**

mass of the glass in sample **(mBAG50/50) = 2.95 mg**

diameter of one bioactive glass particle **(d1BAG\*) = 12 μm**

*\*BAG – bioactive glass*

*\*1BAG – one bioactive glass particle*

1. Calculations (mass of BAG per sample), mg

Once we know that concentration of GG is 5 mg/ml, then we can calculate amount of GG per 0.65 ml of sample or per one sample:

m (GG per sample) = Vsample \* CGG = 0.65\*5 = 3.25 mg

Once we know the weight ratio of gellan gum and bioactive glass, we can estimate amount of glass per sample from the proportion:

$$m\_{^{BAG}/\_{sample}}= \frac{Weight ratio ^{BAG}/\_{sample} \*m ^{GG}/\_{sample}}{weight ratio ^{GG}/\_{sample}}$$

**GG/BAG 80/20 wt%:** BAG per sample = 20\*3.25/80 = 0.8125 **≈ 0.81**

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| **GG/BAG, wt%** | **90/10** | **80/20** | **70/30** | **60/40** | **50/50** |
| **BAG per sample, mg** | **0.36** | **0.81** | **1.39** | **2.17** | **3.25** |

2. Calculations (VBAG /Vsample, %) and calculated changed of particles (N):

1. **Vsample**

Volume of sample is calculated as volume of cylinder:

 **Vsample = πr2h = 3.14\*(6.5/2)2\*11.5 = 398.87 mm3**

r = d/2

1. **V one BAG particle (V1BAG)**

Volume of one BAG particle is calculated as the volume of sphere: **V1BAG = 4/3 πr³ = 9.04\*10-7mm3**

diameter of one BAG particle (d1BAG\*) = 12 μm = 12\*10-3mm

r = d/2

1. **m one BAG particle (m1BAG)**

**m1BAG = V1BAG\* ÞBAG = 9.04\*10-7 \* 2.6 = 2.35\*10-6 mg**

ÞBAG = 2.6 g/sm3 = 2.6\*103/103 = 2.6 mg/mm3

1. **N (calculated amount of particles)**

Theoretical amount of particles are calculated as mass of glass into sample divided into mass of one bioactive glass particle.

For example: **GG/BAG 50/50wt%: N = 3.25/2.35\*10-6 = 1 382 978**

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| --- | --- | --- | --- | --- | --- |
| **GG/BAG, wt%** | **90/10** | **80/20** | **70/30** | **60/40** | **50/50** |
| **Number of calculated particles (N)** | **153 111** | **344 500** | **591 179** | **922 920** | **1 382 254** |

1. **VBAG**

Volume of bioactive glass is number of particles multiplied by the volume of one particle.

**GG/BAG 50/50 wt%: V BAG = N\*V1BAG = 1 254 661\*9.04\*10-7 = 1.13 mm3**

1. **VBAG /Vsample**

From sections 1. and 5. we know the volume of BAG and volume of sample, thus:

**GG/BAG 50/50wt%: VBAG/Vsample = (1.13/398.87)\*100% = 0.28%**

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| **GG/BAG, wt%** | **90/10** | **80/20** | **70/30** | **60/40** | **50/50** |
| **V BAG/V sample (calculated)** | **0.04** | **0.08** | **0.14** | **0.21** | **31** |

Calculated data :

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| GG/BAG, wt% | Vsample | V1BAG | m1BAG | N | V BAG | Vsample | V BAG/Vsample\*100% |
| 90/10 | 398.8714271 mm3 | 9.04x10-7 | 2.35x10-6 | 153111 | 0.14mm3 | 398.87mm3 | 0.04% |
| 80/20 | 344500 | 0.31mm3 | 0.08% |
| 70/30 | 591179 | 0.54mm3 | 0.14% |
| 60/40 | 922920 | 0.84mm3 | 0.21% |
| 50/50 | 1382254 | 1.25mm3 | 0.31% |

Measured data (µCT, 5.64pix, Figure 1):

Day 0

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| --- | --- | --- | --- |
| GG/BAG, wt% | Vsample | VBAG | V BAG/Vsample\*100% |
| 90/10 | 8.63x101mm3 | 1.09x10-4mm3 | 0.00 |
| 80/20 | 1.34 x102mm3 | 2.59 x10-3mm3 | 0.00 |
| 70/30 | 1.34 x102mm3 | 9.25 x10-2mm3 | 0.07 |
| 60/40 | 1.34x102mm3 | 2.52 x10-1mm3 | 0.19 |
| 50/50 | 1.28x102mm3 | 4.04x10-11mm3 | 0.32 |

Day 7(*in vitro*, SBF)

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| --- | --- | --- | --- |
| GG/BAG, wt% | Vsample | VBAG | V BAG/Vsample\*100% |
| 90/10 | 1.10x102mm3 | 3.01 x10-4mm3 | 0.00 |
| 80/20 | 1.06 x102mm3 | 3.30 x10-4mm3 | 0.00 |
| 70/30 | 1.34 x102mm3 | 3.49 x10-4mm3 | 0.00 |
| 60/40 | 1.34 x102mm3 | 3.18 x10-2mm3 | 0.02 |
| 50/50 | 1.34 x102mm3 | 5.51 x10-3mm3 | 0.00 |