Supplementary Information:

"Gas bubble dynamics in soft materials"

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Supp. Info. Abstract: Here we provide tables of numerical values of dissolving times for a bubble embedded in an soft elastic medium. These values are intended to serve as benchmarks for those readers who may want to check their work against ours.

I. $(\partial c/\partial r)_R$ FROM THE DIFFUSION EQUATION

The dissolving time for a bubble embedded in an elastic medium is found by numerically solving the differential equation

$$\frac{dR}{ds} = \frac{6BTD^{*}(P_{WSR} - P_e + 4G/3 - 2\gamma/R)}{(3P_eR + 4\gamma - 4GR)K_H}\left\{s + \frac{R}{\sqrt{\pi D^{*}}}\right\}, \tag{1}$$

which is obtained by combining Eqs. (10), (14), and (15) from the main article, together with the change of variable

$$t = s^2. \tag{2}$$

This change of variable eliminates the singularity at $t = 0$ (see Section 3 of the main article).

A tabulated series of dissolving times for different combinations of the shear modulus G, and initial radius R_0 is given in Table I.

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	$t_d(R_0, G) \times \text{sec}^{-1}$ ($(\partial c/\partial r)_R$ from the Diffusion equation.)			
$R_0 \times \mu^{-1}$	$G = 0.0$atm	$G = 0.1$atm	$G = 0.2$atm	$G = 0.3$atm
5	0.4741	0.5365	0.6483	0.9195
10	2.477	3.119	4.808	∞
15	6.337	8.546	16.38	∞
20	12.16	17.21	40.19	∞
25	20.01	29.33	82.27	∞
30	29.9	45.04	150.3	∞

TABLE I. Dissolving times obtained numerically from Eq. (1). Here we have used $T = 298.15\ K$, $P_e = 1$ atm, $P_{WSR} = 0.75$ atm, $D^* = 2900\ \mu^2/\text{sec}$, $\gamma = 0.7\ \mu\cdot$atm (70 dynes/cm), $B = 0.082057$ atm·l·mol$^{-1} \cdot K^{-1}$, and $K_H = 1614$ atm·l·mol^{-1}.

II. $(\partial c/\partial r)_R$ FROM THE LAPLACE EQUATION

The time evolution of a bubble embedded in a soft elastic material, using $(\partial c/\partial r)_R$ obtained from the Laplace equation (Eq. (17) in the main paper), is given by

$$t = \frac{1-\alpha}{2D^* d(1-f-\alpha)}(R_0^2 - R^2) - \frac{2\gamma(2f+1-\alpha)}{3D^* d(1-f-\alpha)^2 P_e}(R_0 - R) + \frac{4\gamma^2(2f+1-\alpha)}{3D^* d(1-f-\alpha)^3 P_e^2} \ln\left(\frac{(1-f-\alpha)R_0 P_e + 2\gamma}{(1-f-\alpha)R P_e + 2\gamma}\right), \tag{3}$$

where

$$d \equiv \frac{BT}{K_H}, \qquad f \equiv \frac{P_{WSR}}{P_e}, \qquad \text{and} \qquad \alpha \equiv \frac{4G}{3P_e} \tag{4}$$

Equation (3) has physical units and is equivalent to Eq. (26) of the main paper.

The dissolving times shown in Table II were obtained from:

$$t_d = \frac{1-\alpha}{2D^* d(1-f-\alpha)} R_0^2 - \frac{2\gamma(2f+1-\alpha)}{3D^* d(1-f-\alpha)^2 P_e} R_0 + \frac{4\gamma^2(2f+1-\alpha)}{3D^* d(1-f-\alpha)^3 P_e^2} \ln\left(\frac{(1-f-\alpha)R_0 P_e + 2\gamma}{2\gamma}\right), \tag{5}$$

which was obtained from Eq. (3) with R set equal to 0.

	$t_d(R_0, G) \times \text{sec}^{-1}$ ($(\partial c/\partial r)_R$ from the Laplace equation.)			
$R_0(\mu)$	$G = 0.0$atm	$G = 0.1$atm	$G = 0.2$atm	$G = 0.3$atm
5	0.5316	0.5982	0.7172	1.004
10	2.74	3.417	5.189	∞
15	6.965	9.286	17.44	∞
20	13.32	18.61	42.42	∞
25	21.86	31.6	86.27	∞
30	32.61	48.42	156.8	∞

TABLE II. Dissolving times obtained from Eq. (5). Here we have used $T = 298.15\ K$, $P_e = 1$ atm, $P_{WSR} = 0.75$ atm, $D^* = 2900\ \mu^2$/sec, $\gamma = 0.7\ \mu$·atm (70 dynes/cm), $B = 0.082057$ atm·l·mol$^{-1} \cdot K^{-1}$, and $K_H = 1614$ atm·l·mol^{-1}.