tion, this product has demonstrated excellent shelf storage stability withstanding 3 weeks at 50° C. without a significant decrease in performance while—Bond (Kulzer), the only commercial single-component SEA gelled after storage at 50 248 C for a week. In comparison with current commercial self-etching adhesive products, the 1P-SEA exhibits comparable or superior bonding performance, storage stability and shelf life.

Table 5 shows 24-hr dentin shear bond strength of 1P-SEA after storage at different temperatures and for different time duration. Table 6 compares bond strength of three different experimental 1P-SEA differing only in aromatic amines. DHEPT and EDAB are two most commonly used co-initiators for CQ. The formulations containing either DHEPT or EDAB did not lead to acceptable balanced properties. Only the formulation incorporating DMABN exhibits the superior balance of bond strength, storage stability and compatibility with different curing lights, e.g., QTH light and LED light. DMABN is the first time ever used in any dental adhesive.

TABLE 5

24 hr Dentin SBS of 1P-SEA in MPa (Mean ± Stdev.)

Time (week)	37° C.	45° C.	50° C.	60° C.
0	17.6 ± 5.2	17.6 ± 5.2	17.6 ± 5.2	17.6 ± 5.2
1	NT	NT	NT	18.8 ± 7.5
1.5	NT	NT	NT	17.5 ± 4.6
2	NT	NT	17.8 ± 5.8	12.3 ± 4.2
3	NT	19.4 ± 9.2	18.1 ± 7.2	10.8 ± 3.5
3.5	NT	16.6 ± 3.8	17.9 ± 6.8	NT
4	NT	17.8 ± 5.1	8.2 (2.2)	NT
6	16.8 ± 7.0	15.0 ± 5.6	NT	NT
7	NT	16.7 ± 5.0	NT	NT
8	24.0 ± 2.8	17.5 ± 5.2	NT	NT
10	15.5 ± 4.8	7.3 ± 3.9	NT	NT
11	17.5 ± 4.6	NT	NT	NT
12	12.7 ± 3.8	NT	NT	NT

TABLE 6

24 hr Shear Bond Strength of 1P-SEA Containing Different Co-initiators

Sample I.D.			1P-SEA containing DMABN	1P-SEA containing DHEPT	1P-SEA containing EDAB
Human	RT	QTH Light	23.2 (3.9)	NT	17.0 (7.5)
Dentin	stored	LED Light	22.0 (4.0)	NT	15.6 (5.7)
SBS (MPa):	50° C.	QTH Light	15.3 (4.2)	NT	14.5 (6.9)
Mean (SD)	3 weeks	LED Light	15.8 (6.1)	NT	16.8 (6.8)
Human	RT	QTH Light	26.4 (5.3)	13.5 (6.7)	32.7 (7.2)
Enamel	stored	LED Light	32.0 (3.0)	NT	30.1 (7.3)
SBS (MPa):	50° C.	QTH Light	26.7 (5.3)	NT	7.6 (2.0)
Mean (SD)	3 weeks	LED Light	35.3 (7.9)	NT	24.8 (13.3)

SEA exhibits excellent shear bond strength on both dentin and enamel when used with Self-Cure Activator to bond resin cements (i.e. Calibra). FIG. **4** illustrates that SEA has improved bonding performance in comparison to Prime & Bond NT for bonding Calibra to tooth substrates.

Packaging Addendum

The minimum design specifications for SEA require a unit-dose packaging format similar to the system currently used for Prime & Bond® NT. Dentsply International, under U.S. Pat. No. 6,372,816 has patented this system (packaging), Waltz, et al., as of Apr. 16, 2002. The ideal requirements for packaging are defined as "integral brush unit-dose" (IB unit-dose). Patent application Ser. No. 10/668,946, Pierson, et al., Sep. 23, 2003, has been submitted for the IB unit-dose packaging under case number LDC-922-E.

What is claimed is:

1. A one-part, self-etching dental adhesive comprising 5 to 15% by weight 2-methyl-acrylic acid 1-methyl-2-{3,5,5-trimethyl-6-[1-methyl-2-(2-methyl-acryloyloxy)-ethoxycarbonyl amino]-hexylcarbamoyloxy}-ethyl ester; 8 to 20% by weight 2-methyl-acrylic acid 4-(2-methyl-acryloyloxy)-2,2,3-tris-(2-methyl-acryloyloxymethyl)-3-phosphonooxymethyl-butyl ester; 0 to 5% by weight 2-methyl-acrylic acid 2-hydroxy-ethyl ester; 5 to 15% by weight 2-methyl-acrylic acid 3-acryloyloxy-2-hydroxy-propyl ester; 0 to 5% by weight 2-methyl-acrylic acid 2,2-bis-(2-methyl-acryloyloxymethyl-butyl ester; 0.1 to 2.0% by weight diphenyl (2,4,6-trimethylbenzoyl)phosphine oxide; 0.05 to 0.50% by weight camphorquinone; 0.1 to 1.2% by weight dimethylaminobenzonitrile; 0.01 to 0.2% by weight 2,6-bis(1,1-dimethylethyl-4-methyl)phenol; 0 to 1.0% by weight hexadecylammonium fluoride; 5 to 20% by weight water; and 20 to 60% by weight acetone.

2. A one-part, self-etching dental adhesive comprising 10.5% by weight 2-methyl-acrylic acid 1-methyl-2-{3,5,5-trimethyl-6-[1-methyl-2-(2-methyl-acryloyloxy)-ethoxycarbonyl amino]-hexylcarbamoyloxy}-ethyl ester; 12.8% by weight 2-methyl-acrylic acid 4-(2-methyl-acryloyloxy)-2,2,3-tris-(2-methyl-acryloyloxymethyl)-3-phosphonooxymethyl-butyl ester; 3.2% by weight 2-methyl-acrylic acid 2-hydroxy-ethyl ester; 9.5% by weight 2-methyl-acrylic acid 3-acryloyloxy-2-hydroxy-propyl ester; 1.6% by weight 2-methyl-acrylic acid 2,2-bis-(2-methyl-acryloyloxymethyl-butyl ester; 0.99% by weight diphenyl (2,4,6-trimethylbenzoyl)phosphine oxide; 0.19% by weight camphorquinone; 0.79% by weight dimethylaminobenzonitrile; 0.13% by weight 2,6-bis(1,1-dimethylethyl-4-methyl)phenol; 0.3% by weight hexadecyl-ammonium fluoride; 12.6% by weight water; and 47.4% by weight acetone.

* * * * *