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(12) **United States Patent**  
**Isaacs**

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- (54) **GLP-2 FORMULATIONS**
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- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 628 days.

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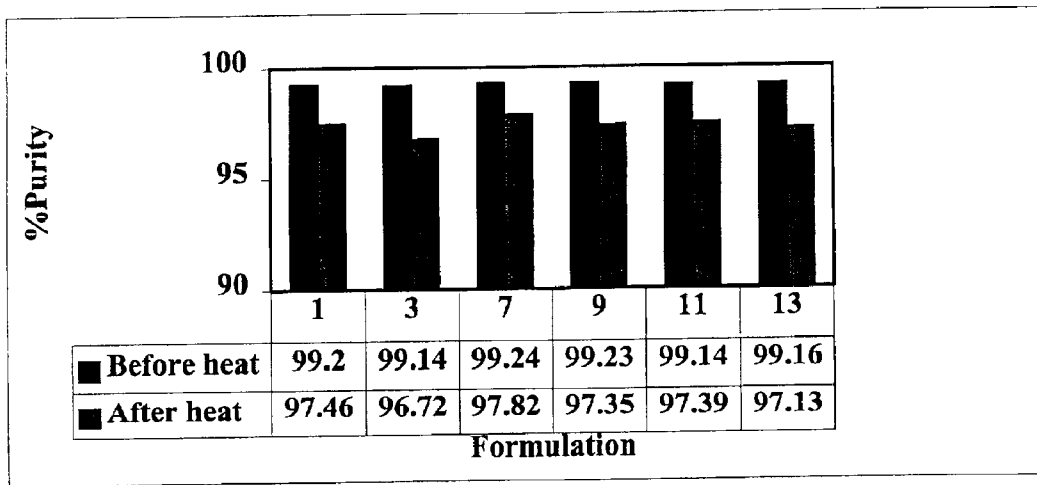
(57) **ABSTRACT**

The invention is directed to formulations of GLP-2 peptides and analogs thereof exhibiting superior stability following storage and/or exposure to elevated temperatures. The GLP-2 compositions comprise a GLP-2 peptide or an analog thereof, a phosphate buffer, L-histidine, and mannitol.

**75 Claims, 6 Drawing Sheets**

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**A61K 38/26** (2006.01)  
**C07K 14/00** (2006.01)
- (52) **U.S. Cl.** ..... **514/12**; 530/308; 530/399;  
530/324; 435/4; 435/287.1
- (58) **Field of Classification Search** ..... 514/12;  
530/308, 399, 324; 435/4, 287.1  
See application file for complete search history.
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Figure 1. Amino acids screening in buffers using heat stress.



**Formulation**

- 1. 10 mM Phosphate, 10 mM Glu
- 3. 10 mM Phosphate, 10 mM Citrate
- 7. 10 mM Phosphate, 10 mM Ser
- 9. 10 mM Phosphate, 10 mM Pro
- 11. 10 mM Phosphate, 10 mM His
- 13. 10 mM Phosphate, 10 mM Gly

Figure 2. Screening of buffers using heat stress.

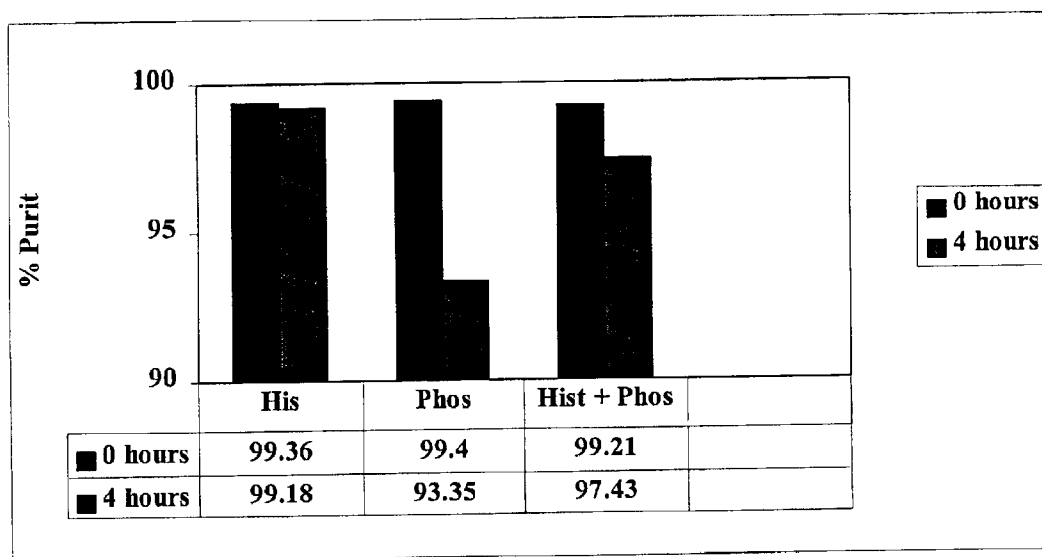
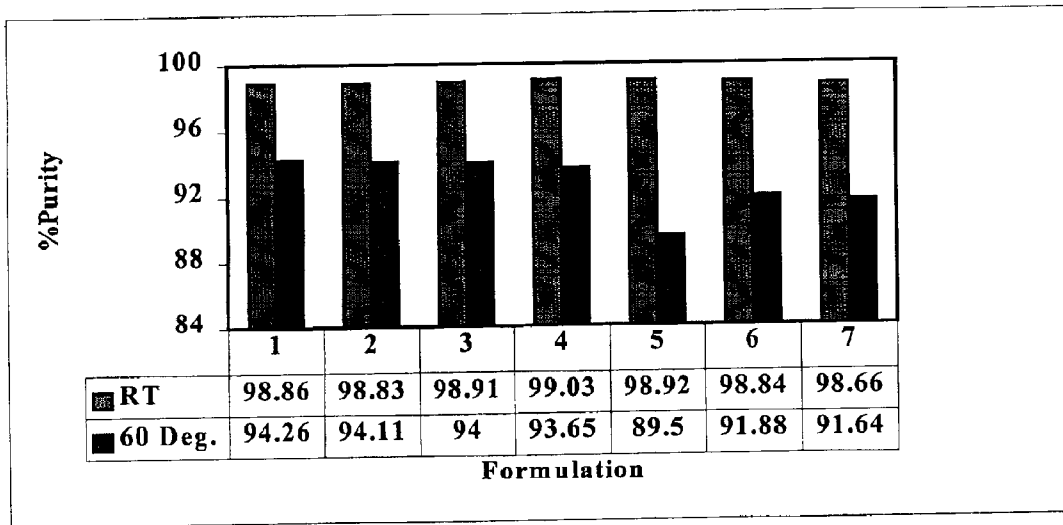


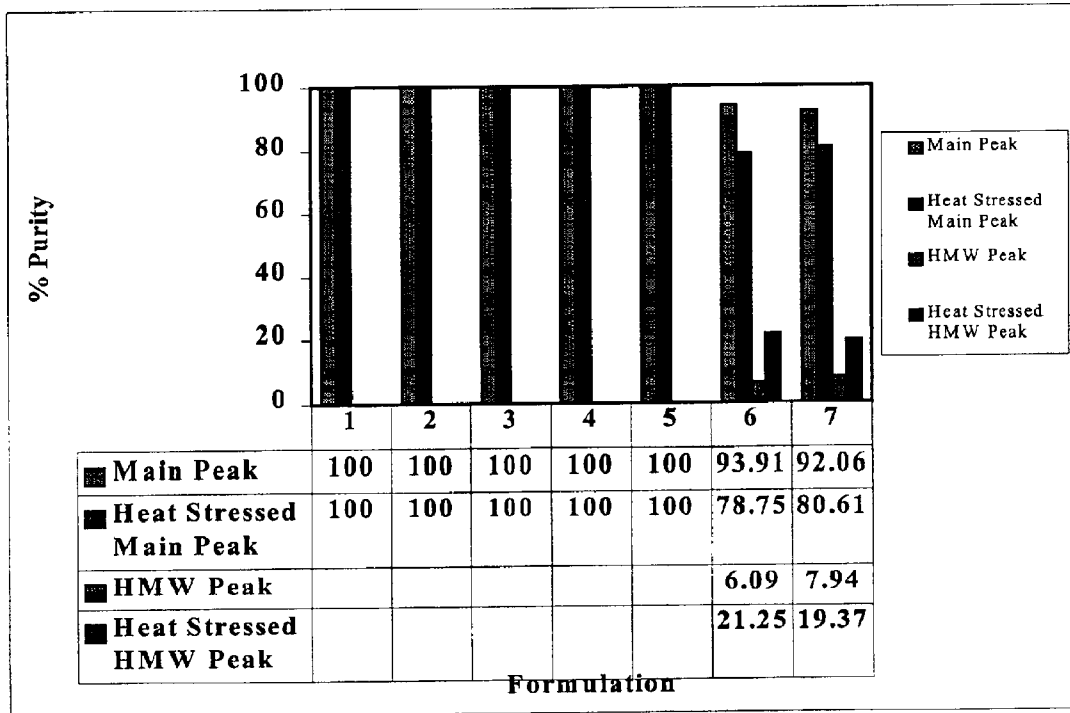
Figure 3. Screening of Bulking agents analyzed by RP-HPLC.



**Formulation**

1. 25 mM Histidine, 35 mM phosphate, 3% Mannitol
2. 50 mM Histidine, 35 mM phosphate, 3% Mannitol
3. 75 mM Histidine, 35 mM phosphate, 3% Mannitol
4. 25 mM Histidine, 25 mM phosphate, 3% sucrose
5. 25 mM Histidine, 25 mM phosphate, 3% trehalose
6. 25 mM Histidine, 25 mM phosphate, 3% maltose
7. 25 mM Histidine, 25 mM phosphate, 3% lactose

Figure 4. Bulking agents analyzed by SE-HPLC.



**Formulation**

1. 25 mM Histidine, 35 mM phosphate, 3% Mannitol
2. 50 mM Histidine, 35 mM phosphate, 3% Mannitol
3. 75 mM Histidine, 35 mM phosphate, 3% Mannitol
4. 25 mM Histidine, 25 mM phosphate, 3% sucrose
5. 25 mM Histidine, 25 mM phosphate, 3% trehalose
6. 25 mM Histidine, 25 mM phosphate, 3% maltose
7. 25 mM Histidine, 25 mM phosphate, 3% lactose

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